Initial validation of a simple, nonbiological, mechanical ERCP training model for cannulation and stent placement

Few models are available for hands-on training in endoscopic retrograde cholangiopancreatography (ERCP). Moreover, the key aspect of learning ERCP properly is the acquisition of manual and visual skills [1,2]. Although performing ERCP procedures in human beings eventually leads to expertise, both experts and endoscopy societies strongly encourage that some of the key skills be acquired with the use of training models [3]. Herein, we show a simple ERCP model for training endoscopists in scope insertion, wheel handling, cannulation, and stent insertion. The model consists of a metal cage, which serves to hold synthetic elements that comprise a model of the upper gastrointestinal and pancreaticobiliary tracts (Fig. 1, Video 1). The esophagus, stomach, and duodenal sweep are constructed from a plastic tube (Fig. 2a). The papillae are made of latex, and the bile ducts are made of plastic. The pancreaticobiliary tree can be attached to the cage at various levels of difficulty (Fig. 2b).

The model was placed on a table, and ERCP was then performed by five trainees and by five endoscopists with and without ERCP experience (Video 1). An Olympus duodenoscope (TJF-Q180V; Olympus America, Center Valley, Pennsylvania, USA) was used. The endoscopists were filmed, observed, and guided by two ERCP experts (Fig. 3, Video 1). The endoscopists also filled out questionnaires on various aspects of the model, including endoscope handling, visual realism, usefulness, and performance. The model was useful for performing and training in the
In summary, this model appears novel and useful for various reasons. First, it can be used in any endoscopy unit. Second, there is no need to buy or use special endoscopes because the model is nonbiological and does not contain any tissue. Thus, the endoscope may be cleansed during standard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cleansed during stand-
ard reprocessing. In contrast, biological endoscope may be cle