ORIGINAL ARTICLE

Directional movement guide for digital single-operator cholangioscopy system

Weigang Gu, MD,[1,*] Justin Ryan L. Tan, MD,[1,2,3,*] Hangbin Jin, MD,[1] Qifeng Lou, RN,[1] Chuang Tang, RN,[1] Ka Shing Cheung, MD,[1,4,5] Jianfeng Yang, MD,[1] Xiaofeng Zhang, MD[1]

INTRODUCTION

Digital single-operator cholangioscopy is an endoscopic procedure characterized by the use of a minimally invasive flexible endoscope to examine and treat biliary tract diseases.[1,2] Despite the known advantages of digital single-operator cholangioscopy, the adoption of this technique by endoscopists remains low because of its high costs, lack of guidelines, and few training programs.[1] Unfamiliarity with cholangioscopy among endoscopists may translate to a steeper learning curve, which can increase procedure time, errors, and adverse events.[1-3] There is limited literature specifically focused on training methods for cholangioscopy. Previous studies on training consist of percutaneous cholangioscopy, use of a porcine model, as well as a 3-dimensional printing model.[4-7]

AIM AND METHOD

The aim of this video article is to provide a simplified guide to the basic movements and combination movements for 2 commercially available cholangioscope systems. SpyGlass DS II (Boston Scientific, Marlborough, Mass, USA) and 9F EyeMax (Micro-Tech Nanjing Co, Ltd, Nanjing, China) were both used to demonstrate the movement inside a custom biliary tract model (Pulse MDM, Holland, Pa, USA). The rotational direction for each wheel and its corresponding movement was observed inside the model. The 2 cholangioscopy systems use a 2-wheeled control mechanism with similar directional movements (Video 1, available online at www.videogie.org). This guide categorizes these movements into 2 primary types: basic and combination. Basic movements involve the independent rotation of a single wheel, whereas combination movements involve coordinated movements achieved through combinations of these basic rotations. Although there are various possible rotation patterns to designate specific directions, the authors of this study present a straightforward and systematic method employing a clockface-based interface for navigating the entire circular range.

BASIC MOVEMENTS

Clockwise rotation of the large wheel positions the cholangioscope at the 4- to 5-o'clock position (Fig. 1). Counterclockwise rotation of the large wheel positions the cholangioscope at the 10- to 11-o'clock position (Fig. 2). Clockwise rotation of the small wheel positions the cholangioscope at the 1- to 2-o'clock position (Fig. 3). Counterclockwise rotation of the small wheel positions the cholangioscope at the 7- to 8-o'clock position (Fig. 4).

COMBINATION MOVEMENTS

The large wheel is first locked in a clockwise rotation followed by a clockwise half-rotation of the small wheel, which positions the cholangioscope at the 3-o'clock position (Fig. 5). The large wheel is first locked in a clockwise rotation followed by a counterclockwise half-rotation of the small wheel, which positions the cholangioscope at the 6-o'clock position (Fig. 6). The large wheel is first locked in a counterclockwise rotation followed by a counterclockwise half-rotation of the small wheel, which positions the cholangioscope at the 9-o'clock position (Fig. 7). The large wheel is first locked in a counterclockwise rotation followed by a clockwise half-rotation of the small wheel, which positions the cholangioscope at the 12-o'clock position (Fig. 8).

LIMITATIONS

Our endoscopy unit uses only 2 cholangioscopes: the 9F EyeMax and the SpyGlass DS II, which possesses a

*Weigang Gu, MD, and Justin Ryan L. Tan, MD, contributed equally as first authors.

2468-4481
https://doi.org/10.1016/j.vgie.2024.08.009

Department of Gastroenterology, Affiliated Hangzhou First People's Hospital, Hangzhou, China (1), Section of Gastroenterology, Chinese General Hospital and Medical Center, Manila, Philippines (2), Section of Gastroenterology, Metropolitan Medical Center, Manila, Philippines (3), The University of Hong Kong-Shenzhen Hospital, Department of Medicine, Shenzhen, China (4), Department of Medicine, Queen Mary Hospital, Hong Kong, China (5).

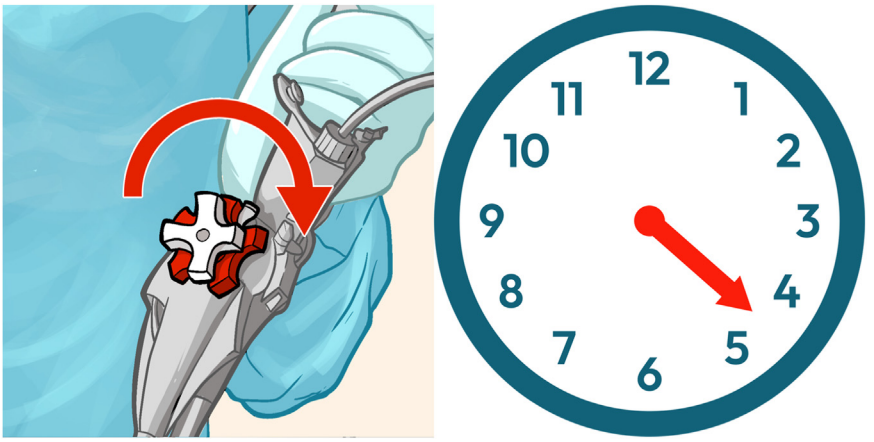

Figure 1. Clockwise rotation of the large wheel positions the cholangioscope at the 4- to 5-o'clock position.

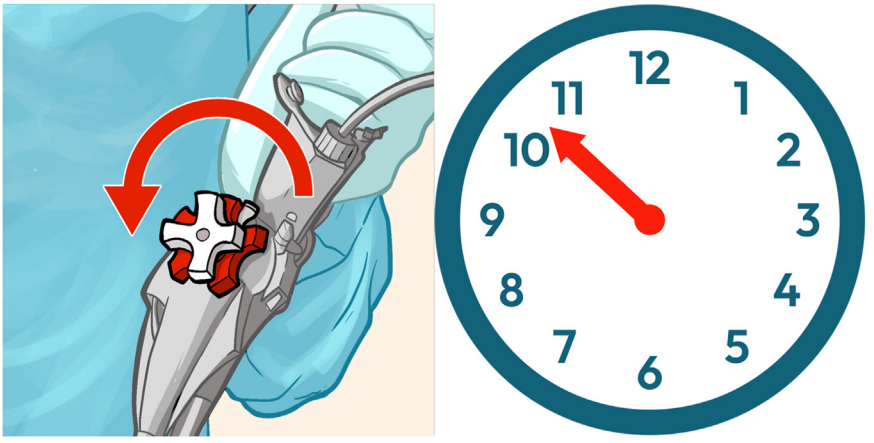

Figure 2. Counterclockwise rotation of the large wheel positions the cholangioscope at the 10- to 11-o'clock position.

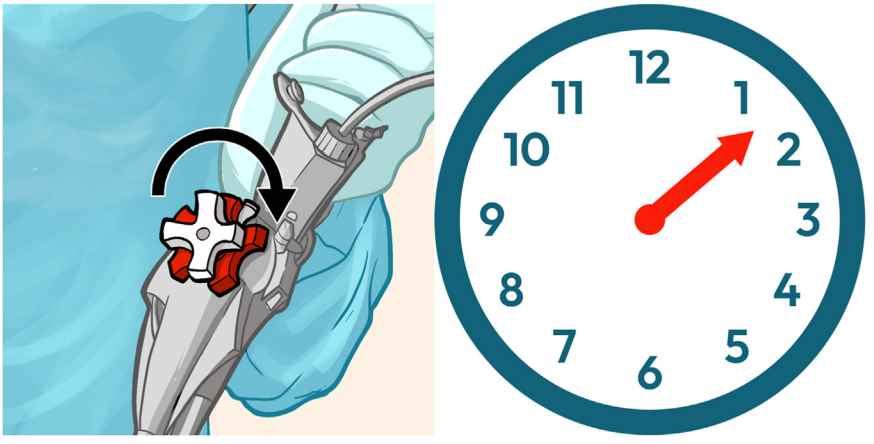

Figure 3. Clockwise rotation of the small wheel positions the cholangioscope at the 1- to 2-o'clock position.

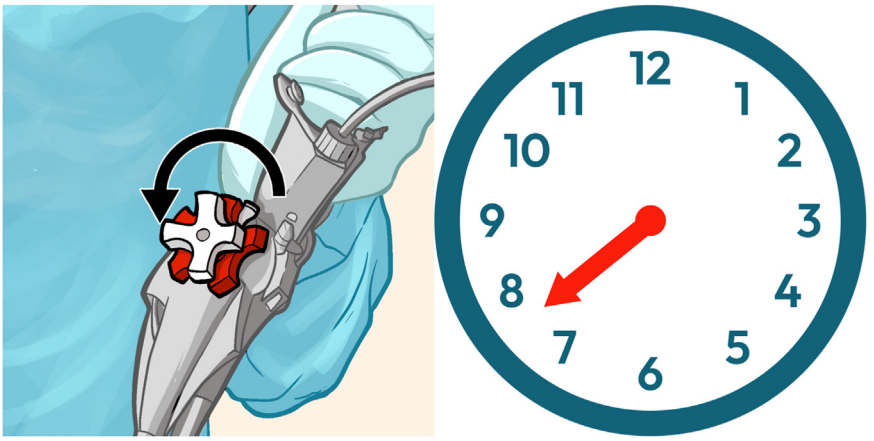

Figure 4. Counterclockwise rotation of the small wheel positions the cholangioscope at the 7- to 8-o'clock position.

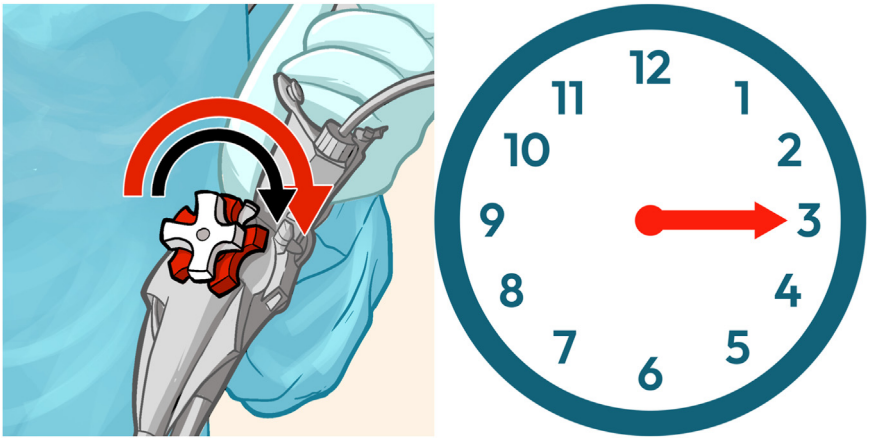

Figure 5. Clockwise rotation of the large wheel, followed by clockwise half-rotation of the small wheel, positions the cholangioscope at the 3-o'clock position.

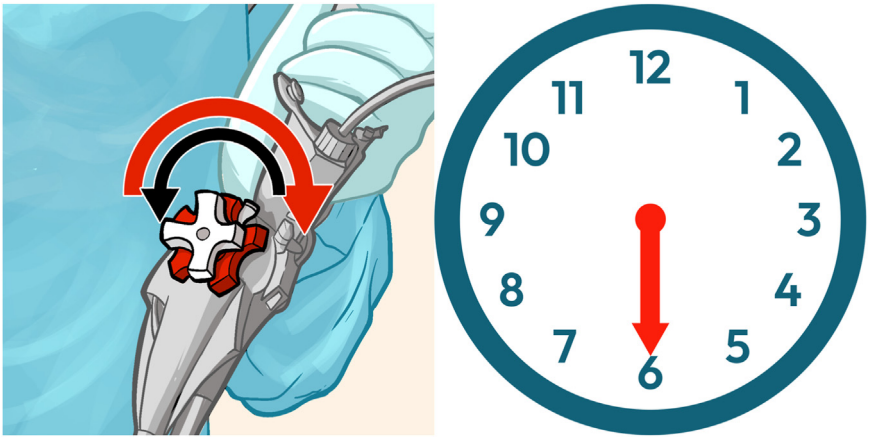

Figure 6. Clockwise rotation of the large wheel, followed by counterclockwise half-rotation of the small wheel, positions the cholangioscope at the 6-o'clock position.

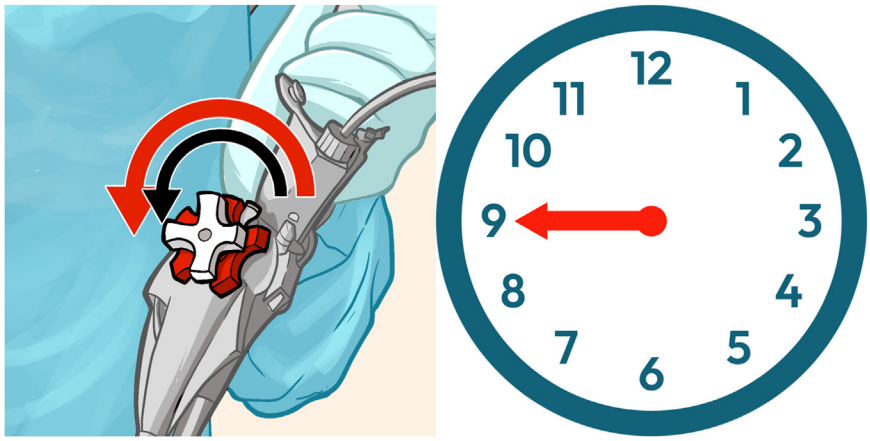

Figure 7. Counterclockwise rotation of the large wheel, followed by counterclockwise half-rotation of the small wheel, positions the cholangioscope at the 9-o'clock position.

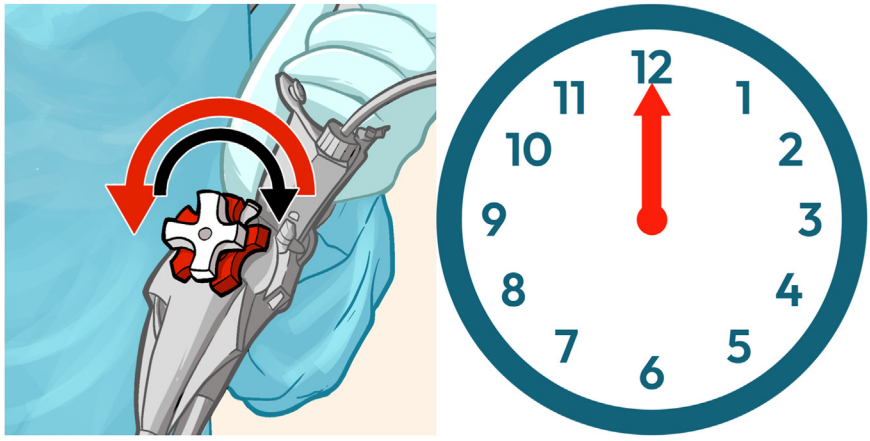

Figure 8. Counterclockwise rotation of the large wheel, followed by clockwise half-rotation of the small wheel, positions the cholangioscope at the 12-o'clock position.

diameter of 10.5F. Both instruments exhibit comparable dimensions. There are other commercially available cholangioscopes with diameters of 7F and 11F. It is possible that these may necessitate distinct rotational patterns for manipulation as the result of their difference in caliber from the ones used in the study. This movement guide can be limited by an inherent anatomical variability and restricted cholangioscope maneuverability encountered in patients with biliary tract pathology. In addition, the presence of accessories within the working channel of the cholangioscope may limit instrument movement.

FUNDING

This study was supported in part by the Zhejiang Province's 2023 Key R&D Plan Project (grant no. 2023C03054); The Natural Science Foundation of Zhejiang Province (grant no. LQ23H160047); Zhejiang Medical and Health Science and Technology Plan (grant no. WKJ-ZJ-2136, 2022RC056, 2023ZR120 and 2023RC229); and Hangzhou Medical and Health Science and Technology Plan (grant no. A20230021).

DISCLOSURE

All authors disclosed no financial relationships.

ACKNOWLEDGMENT

The authors acknowledge Matthew Conner Yu for the for the illustrations.

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