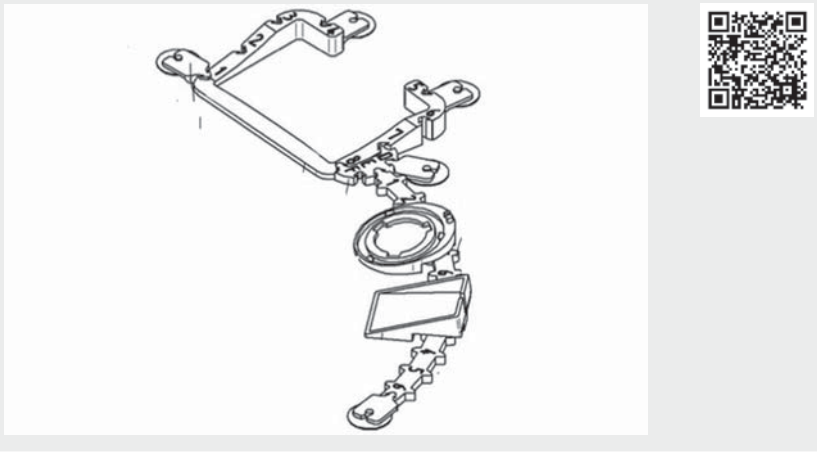
A 3D-printed innovative pedal fixator for connecting different pedal-operated tools to improve work ergonomics during advanced diagnostic and therapeutic endoscopic procedures

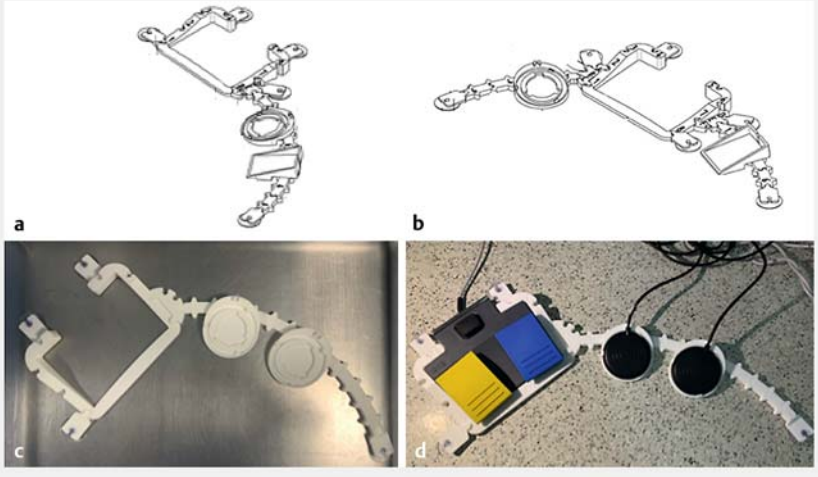
Recent techniques in diagnostic and therapeutic endoscopy require the use of different foot-controlled devices. For example, water immersion colonoscopy [1] and underwater endoscopic mucosal resection (EMR) [2] require the parallel use of two foot pedals, one to control the electrosurgical unit and the other to control the peristaltic pump to fill the colon with water. For endoscopic submucosal dissection [3], the problem becomes even more complex with three pedals to be managed in parallel, since the pump that activates the knife injection must be added.

Although quite difficult to measure, the lack of connection between the various pedals of different shapes and brands leads most teams to place them on the floor without affixing them, leading to numerous displacements of these devices during the procedure, forcing the operator to look away from the operating field to reposition his or her feet. These wanderings to find the pedal are a source of lost time, additional stress and, for beginners, a change of position that forces them to reposition themselves with the scope. This can be a problem when controlling a bleed, for example, where holding a fixed position in front of the bleed is important.

To reduce these difficulties, we have designed and 3D-printed an innovative and versatile device allowing an operator to connect the electric generator and peristaltic pump pedals whatever their shape and brand (▶ **Video 1**, ▶ **Fig. 1**). This device was designed to be versatile, allowing an operator to choose the distance between the pedals, the angulation as well as the position (right/left). Anti-slip systems prevent it from moving. We present here the case of a colonic dissection for a laterally spreading tumor with and without the IPEFIX pedal device (Innovative Pedal Fixator, Lab 3 D HCL, Hospices Civils de Lyon).



Video 1 Parallel between foot movement and endoscopic view of the procedure with and without the innovative pedal fixator (IPEFIX) device.



▶ **Fig. 1** Innovative pedal fixator (IPEFIX) device in schematic and real views.

Future clinical studies are needed to measure the clinical impact of such a device.

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Competing interests

The authors declare that they have no conflict of interest.

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