

Innovation of therapeutic endoscopy – What will robotic technology bring in the future of endoscopy?

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Endoscopy technology has improved for cancer treatment, not for diagnosis purpose only any more. Various developments and clinical use of scopes exclusive for treatment enable us to reach the complicated lesions and also to resect large lesions with few procedural accidents in short time, due to the device improvement. Colonic ESD has been covered by health insurance since April 2012 in Japan and ESD is being improved since then to perform en bloc resection and to evade procedural accidents such as hemorrhage and perforation and also to carry out safely, swiftly and securely. It has been said that it is quite difficult to duplicate complicated surgical techniques using only existing endoscopic equipments since the NOTES concept was introduced, then the development of multifunctional equipments called multi-tasking platform started to improve flexibility of the whole endoscopic technique. `COBRA` (USGI), `The Direct Drive Endoscopic System` (DDES, Boston Scientific) and `Hydra` (Ethicon Endo-Surgery) were presented. After this successive publication Master and slave transluminal endoscopic robot was published in Singapore and this was in clinical use for ESD in 2011 and the next generation machine was introduced in 2014. `ANUBISCOPE` (IRCAD, Karl Storz) started the development in 2005 and ESD was successfully carried out on animal models in December, 2011. `ENDOMINA` from Endo Tools Therapeutics, Belgium is a two-arm platform with smooth joints, which is already in clinical use. Olympus developed `Endo SAMURAI` which is for treatment purpose system. Minimally invasive endoscopic surgery support robot is in NEDO project in Japan. It is a compact combined unit of diagnosis and treatment with endoscopic and robotic and sensing technology.

Robotic Surgery is a minute surgery with minute devices. Robotic forceps reproduces practitioner's hands movements conscientiously. Surgery is persistently operated by endoscopic surgeons who have done numerous robotic surgeries have confirmed that it has many advantages of flexible forceps, tremor filtering function, prominent local controllability and also less complication. With the above mentioned safety and social background, we can expect robot-assisted endoluminal surgery will be used in endoscopic treatment and it will standardize complicated techniques of ESD or EFTR.

Promotion of industry-academic-government joint research and solid medicine-engineering cooperation are expected for the further development and the prevalence in this field.