



The impact of novel instrumentation in promoting uniportal video-assisted thoracoscopic surgery

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With the ongoing advances in surgical innovation over the past decades, focusing on patient comfort and safety is paramount. From the advent of laparoscopic surgery to newer robotic surgical techniques, constant efforts to improve the quality of care we provide to our patients has provided avenues to change our surgical approach to certain diseases. In regards to lung surgery, the classical thoracotomy incision has long been supplanted by the less invasive video-assisted thoracoscopic surgical (VATS) approach with comparable oncologic outcomes with significantly decreased morbidity (1,2). Though VATS may now be considered the preferred surgical approach, there remains areas of improvement in both its diagnostic and therapeutic purposes. In the United States, VATS typically entails multiple ports into the chest wall. However, it has been shown that approximately 50% of patients develop clinically significant post-operative chest wall pain and paresthesias (3). In addition, VATS has historically required the use of straight instruments which may make dissection difficult in tight anatomical spaces. To address some of these drawbacks of VATS, Homma *et al.* describe their approach to uniportal VATS with an innovative curved cotton instrument known as the “CS Two-Way Handle™” (3). Homma *et al.* report the multiple uses and features of this novel instrument that allows for the feasibility of performing uniportal VATS safely (3). As conventional VATS in the United States is performed via a multiport VATS approach, Homma *et al.*'s demonstration of safe and effective uniportal

VATS in Japan is an excellent opportunity to improve surgical methods and technique on a global scale (1-3).

Homma *et al.* succinctly describe their novel instrument, the CS Two-Way Handle™, while clearly demonstrating its use in real-time intra-operatively (3). The CS Two-Way Handle™ features the use of a cotton tip, Naruke Thoraco-Cotton™, that allows for gentle traction and mobilization of delicate tissues when inserted into their special metal rod, Naruke Cotton Finger™. The CS Two-Way Handle™ addresses some limitations by classical “cotton-tipped” instruments in that it is uniquely curved (3). It has been known that curved instruments in laparoscopic surgery help improve the ergonomic position to establish an appropriate triangulation (4). This has been particularly important when attempting to do uniportal surgery as straight instruments may disrupt the operative field of view (4). Thus, the curved CS Two-Way Handle™ allows for feasibility of performing uniportal VATS with improved visualization and decreased interference from other instruments even in difficult and delicate anatomical spaces such as mediastinal lymphadenectomy. The CS Two-Way Handle™ introduces an opportunity that may improve standard, minimally invasive surgical management with increased feasibility of uniportal VATS.

Homma addresses one of the key obstacles in surgical innovation where at times, a surgeon's operative plan is dictated by the available equipment. The CS Two-Way Handle™ not only provides a delicate, yet sturdy cotton tip,

but also provides means of hemostasis as well suctioning and evacuating smoke. The use of a surgical cotton swab to perform blunt dissection has been popular for use in both thoracic and laparoscopic surgery (5). Recent and ongoing efforts are continuing to be made to improve surgical cotton. Fujii *et al.* describe a new “anti-maceration” cotton swab that allow it to be more resistant to mild to moderately bloody surgical fields (5). Fujii *et al.* found that coating the cotton swab with the water-resistant, anti-maceration” resin allowed for longer duration of efficacy than conventional cotton (5). The CS Two-Way Handle™ joins the efforts of ongoing surgical innovation as a potential medium to allow for improved hemostasis in an efficient manner with one instrument through one port.

In addition to the technical advantages that Homma *et al.*'s CS Two-Way Handle™ provides, it's feasible approach to the uniportal VATS may have positive clinical implications. Prior studies have shown conflicting results in regards to mean operative times and morbidity when comparing uniportal and multiport VATS (6,7). In a recent study, outcomes of pain, hospital stay, and patient satisfaction were compared in patients undergoing uniportal *vs.* multiport VATS with early-stage non-small cell lung cancer (NSCLC) (6). It was found that mean operation time was significantly shorter in uniportal VATS (143±43 min) compared to multiport VATS (172±43 min) (P<0.0001) (7). In addition, length of hospitalization was shorter in uniportal VATS (3.1±1.6 days) compared to multiport VATS (4.0±1.6 days) (P=0.0003) (7).

As previously mentioned, the prevalence of chest wall pain and paresthesia after placement of chest ports remain in approximately 50% of patients (3). When comparing uniportal and multiport VATS, it was found that the amount of post-operative analgesic prescriptions was much less in uniportal (11.6%) compared to multiport VATS (37%) which was statistically significant, P<0.0001 (7). In addition, on multivariable logistic regression, uniportal VATS was the only independent predictor for reducing postoperative pain (7).

Another potential advantage of uniportal VATS is on an economic scale. Salati *et al.* compared the postoperative costs of uniportal and multiport VATS in patients with spontaneous pneumothorax (8). It was found that uniportal VATS was much more cost-effective in the post-operative period with a cost of €1,407 compared to multiport VATS with a cost of €1,793 (P=0.03) (8). Although the CS Two Way Handle™ is not available commercially, current data is promising that feasibility of uniportal VATS not only has benefits to the patients and surgeons, but also on a

socioeconomic scale.

Since the advent of uniportal VATS beginning approximately a decade ago, its applications have extended from treating small and simple tumors to now resecting complex and major lung masses (9). Homma's CS Two-Way Handle™ provides a realistic framework of surgical innovation to promote the feasibility of uniportal VATS. The constant strive for improvement in our methods and techniques allows us to provide the optimal care to patients in a safe, efficient, and less invasive manner.

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