1 Thoracic Surgery in Pediatric Patients

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Minimally invasive surgery techniques, since their introduction in the mid-70s, have been increasingly performed in children, thanks to the less invasiveness and faster recovery, and today, thanks to technological development, their use has also been extended to newborns and infants [1–3]. In particular, the benefits of thoracoscopic surgery (TS) include less postoperative pain, shorter hospital stay, fewer wound complications, less long-term musculoskeletal sequelae, and better aesthetic outcomes [4, 5].

In the last 15 years, thanks to the widespread use of minimally invasive surgery, especially for abdominal procedures, the number of thoracoscopic procedures performed is increased, and more and more pediatric surgeons are adopting this technique not only for diagnostic evaluation but also for the operative. Notably, TS requires a significant learning curve, and it is still uncertain which types of thoracoscopic procedures should be recommended as a gold standard.

TS conveys with it several concerns, such as anesthetic considerations, adequate workspace, and control of vascular structures. Advances in new-generation instruments including high-resolution cameras, shorter 3-mm instruments, 5-mm endo-clip, upgraded linear staplers, new energy sources such as harmonic scalpel technology or radiofrequency vessel sealer, and current techniques for single-lung anesthesia have further popularized TS in children. Furthermore, TS is optimized by single-lung ventilation that can usually be accomplished without bronchial blockage with insufflation of CO_2 into the affected pleural cavity with a pressure of 4–8 mm Hg. If one-lung ventilation is required, this can be obtained by placement of numerous devices such as double-lumen endotracheal tube or a single-lumen endobronchial tube [6]. Complications during pediatric minimally invasive thoracic procedures are seldom reported in the literature [7].

Recently, robotic surgical technology began to have a very important role in pediatric surgery. Characteristics of robotic surgical platforms include motion scaling, greater optical magnification, enriched vision, increased instrument dexterity, tremor filtration, and exclusion of the fulcrum effect. These enhancements seem to further ameliorate conventional minimal access surgery [8–10]. Thus, robot-assisted surgery could overcome limitations associated with contemporary surgical technology in pediatric surgery and offer the opportunity to include more complex procedures in children.

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