Editorial

PDA clipping by video-assisted thoracoscopic surgery

Koh Takeuchi

Department of Cardiovascular Surgery, Hanyu General Hospital, Saitama, Japan

Correspondence to: Koh Takeuchi, MD, PhD. Department of Cardiovascular Surgery, 446 Shimoiwase, Hanyu, Saitama, Japan.
Email: khtakeuchi@msn.com.

Comment on: Stankowski T, Aboul-Hassan SS, Seifi-Zinab F, *et al*. Descriptive review of patent ductus arteriosus ligation by video-assisted thoracoscopy in pediatric population: 7-year experience. J Thorac Dis 2019;11:2555-63.

Submitted Jul 25, 2019. Accepted for publication Aug 09, 2019.
doi: 10.21037/jtd.2019.08.49
View this article at: http://dx.doi.org/10.21037/jtd.2019.08.49

Patent ductus arteriosus (PDA) is a frequent pathological congenital cardiac condition in normal birth weight infants, and more frequently in low birth weight neonates. The consequences of a significant left-to-right shunting through the PDA may present hemodynamic and respiratory importance (1). Spontaneous closure of the PDA in normal birth weight neonates occurs in 3 days, but it may persist longer in premature babies (2). Current options for the non-pharmacologic treatment of a PDA include open division or ligation via left thoracotomy or sternotomy, transcatheter device occlusion, and ligation via video-assisted thoracoscopic surgery (VATS). Open division has been used for almost 50 years and represents the "gold standard". Direct visualization and control of the ductus minimize potential risks. To decrease the trauma of surgery, the incision length has been reduced, and muscle-sparing incisions have come into vogue. Despite these refinements, the need for rib retraction remains, and post-thoracotomy pain and scoliosis remained significant long-term complications. The VATS approach enables the ductus to be closed with a minimum of trauma to the chest wall. Conversion to an open thoracotomy is the fallback option during each procedure. Endoscopic ductal closure, like open closure, can be successfully undertaken in patients of any size, as well as in patients in a tenuous hemodynamic state (3). In a premature neonate, the overall incision length may not be less than that used, with regard to an open procedure. However, rib retraction, with its potential long-term effects on the chest wall, are avoided. Potential drawbacks are a technical learning curve and a relatively long procedure. Since their lungs are always congestive, prolonged lung compression may lead to potential lung damage, an increase of afterload in heart and prolonged respiratory management and the need for possible postoperative heart failure management. VATS-PDA has many benefits, but also potential drawbacks. Decreasing postoperative respiratory and cardiac complications may be a clue for future success.

Stankowski and his associates (4) described their recent surgical outcomes of 7-year VATS- PDA. One hundred and twenty-seven patients with a mean age of 1.7 years were involved in this study between February 2012 and October 2018. The cohort was divided into 2 groups, i.e., 2012–2014 (early phase) and 2015–2018 (late phase). Preterm infants accounted for 38.6%. Six deaths (4.7%) occurred during the in-hospital stay, predominantly in the case of neonates. The overall conversion rate to thoracotomy was 16.3%. The conversion rate was significantly improved to less than 5% in the late phase from more than 20% in the initial 2-year experience of the early phase due to the effect of the "learning curve". It did not negatively affect either the early mortality rate or long term survival by conversion from VATS-PDA to conventional thoracotomy. Fifty patients (39.4%) required transfer to the NICU after the surgery and the remainders' hospital stay was 2.2±1.6 days. A 5-year probability of estimated survival according to the Kaplan-Meier curve was 93.6%. Complication rates remain conflicting among the institutions (5-7). The results also showed a higher risk of mortality and morbidity, particularly in small premature babies. The overall mortality in this group of patients was 28.6% (n=6) and a 5-year probability of survival estimated according to the Kaplan-Meier curve was 66.7%, which was significantly lower than that in children weighing over 1,000 g at the time of surgery.

We have previously reported (8) the surgical results from 102 PDA patients with very low birth weight (<1,500 g) by mini-thoracotomy and the clipping approach. Seven deaths out of 86 patients with an extremely low birth weight (<1,000 g) were found in the study (a mortality rate of 8.1%). Intraventricular hemorrhage (IVH), one of the notorious complications during PDA treatment, was relatively high in their report compared to a previous report (9), although no laryngeal nerve dysfunction occurred in their study. In our previous report (8), there was no IVH as a surgical complication among 86 patients of extremely low birth weight (<1,000 g) with PDA. We slowly applied a clip to the PDA by monitoring their blood pressure continuously or occasionally in a frequent-non-invasive fashion. Other complications that Stankowski described were related to the lung, i.e., chylothorax and pneumothorax. Pneumothorax and chylothorax occurred in 5 patients and 2 patients, respectively. Pneumothorax can be avoided by intraoperative chest tube insertion.

It is true that VATS-PDA is new alternative technique to apply for surgical PDA closure. It has theoretical advantages including small incision, less trauma to muscle, no rimb retraction. However, it is technically demanding, requires a longer procedure time with greater lung compression. Based on data from Stankowski and his associates that appeared in the *Journal of Thoracic Disease* (4), application may be limited to large babies with PDA.

Acknowledgments

None.

Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

Ethical Statement: The author is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Cite this article as: Takeuchi K. PDA clipping by video-assisted thoracoscopic surgery. J Thorac Dis 2019;11(Suppl 15):S1835-S1836. doi: 10.21037/jtd.2019.08.49

References

1. Raval MV, Laughon MM, Bose CL, et al. Patent ductus arteriosus ligation in premature infants: who really benefits, and at what cost? J Pediatr Surg 2007;42:69-75.
2. Hsiao CC, Wung JT, Tsao LY, et al. Early or late surgical ligation of medical refractory patent ductus arteriosus in premature infants. J Formos Med Assoc 2009;108:72-7.
3. Miyaji K, Ka K, Okamoto H, et al. One-lung ventilation for video-assisted thoracoscopic interruption of patent ductus arteriosus. Surg Today 2004;34:1006-9.
4. Stankowski T, Aboul-Hassan SS, Seifi-Zinab F, et al. Descriptive review of patent ductus arteriosus ligation by video-assisted thoracoscopy in pediatric population: 7-year experience. J Thorac Dis 2019;11:2555-63.
5. Chen H, Weng G, Chen Z. Comparison of posterolateral thoracotomy and vide-assisted thoracoscopic clipping for the treatment of patent ductus arteriosus in neonates and infants. Pediatr Cardiol 2011;32:386-90.
6. Villa E, Vanden Eynden F. Paediatric video-assisted thoracoscopic clipping of patent ductus arteriosus: experience in more than 700 cases. Eur J Cardiothorac Surg 2004;25:387-93.
7. Burke RP, Jacobs JP, Cheng W. Video-assisted thoracoscopic surgery for patent ductus arteriosus in low birth weight neonates and infants. Pediatrics 1999;104:227-30.
8. Takeuchi K, Hirota A, Minegishi S, et al. Current treatment options for the management of patent ductus arteriosus. Pediatric Health Med Ther 2013;4:23-7.
9. Reese J, Scott TA, Patrick SW. Changing patterns of patent ductus arteriosus surgical ligation in the United States. Semin Perinatol 2018;42:253-61.

