AB065. 229. On the growth and form of the mesentery

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Background: Systematic study of the mesentery has demonstrated that it is both continuous and spiral in nature from duodenum to rectum. Embryological planes are commonly exploited during abdominal surgery; however, the exact morphogenesis of the mesentery remains unknown. This study aimed to characterise the three-dimensional structure of the developing mesentery.

Methods: Embryological (n=12), foetal (n=4) and cadaveric (n=2) specimens were sectioned, stained and digitized. Regression analysis (SIFT; ImageJ2, v1.50e, NIH, USA) stacked sections in their true alignment. An internal panel of two reviewers verified manual tracings of regional anatomy and performed a double-blinded comparison of age-matched embryos. To test the reliability of manual tracing, five operators independently traced developing structures. Findings from three-dimensional outputs were further investigated with cadaveric dissection.

Results: Areas of mesoderm, endoderm and vasculature were reliably traced by operators [intra-class correlation coefficients 0.999 (95% CI, 0.998–0.999), 0.976 (95% CI, 0.938–0.994), and 0.995 (95% CI, 0.988–0.999) respectively]. Rendered volumes had a high degree of spatial overlap between operators [Sørensen-Dice similarity coefficient (mean ± SD) of mesoderm 0.9949±0.0085 (0.994–0.996), endoderm 0.9224±0.0067 (0.91–0.931), and vasculature 0.9379±0.00365 (0.933–0.944)]. Bland-Altman analysis demonstrated no systematic bias between operators. Three-dimensional visualisation of fore-, mid- and hindgut regions of the mesentery enabled identification of continuity between all regions in every specimen. Cadaveric dissection replicated three-dimensional observations.

Conclusions: The mesentery, continuous from mesogastric to mesorectal level, is the exclusive intermediate between viscera and the remainder of the body. This developmental model provides a structural framework for understanding and further investigating visceral and neurovascular development.

Keywords: Mesentery; embryology; development

doi: 10.21037/map.2018.AB065

Cite this abstract as: Byrnes KG, Walsh D, Ullah MF, Hashmi O, Westby D, Garritt A, Mirapeix R, Lamers W, Wu Y, Zhang SX, Quondamatteo F, Dockery P, McDermott KW, Coffey JC; Human Mesentery Project Consortium. On the growth and form of the mesentery. Mesentery Peritoneum 2018;2:AB065. doi: 10.21037/map.2018.AB065