

## Operative Vectors, Anatomic Distortion, Fluid Dynamics and the Inherent Effects of Pneumatic Insufflation Encountered During Transanal Total Mesorectal Excision

S Atallah, P Gonzalez, S Chadi, R Hompes, J Knol

### Abstract

**Background:** Transanal total mesorectal excision (taTME) is an altogether different approach to rectal cancer surgery, and the effects of carbon dioxide (CO<sub>2</sub>) on this dissection remain poorly described.

**Methods:** This article critically examines the effect of carbon dioxide insufflation and the workspace it creates during the process of taTME. The unique aspects of insulation with this approach are governed by the laws of physics, especially the principles of fluid dynamics, an area that remains poorly described for laparoscopy and not at all described for taTME.

**Results:** A summary of established factors which affect the operative field of the taTME surgeon is delineated and further explored. In addition, new concepts regarding gas delivery, such as insufflation vectors, anatomic distortion, hyper-dissection, and workspace volume rate of change as a function of taTME dissection time, are addressed. Collectively, these factors pose important challenges which increase case complexity and are thus essential for taTME trainers and trainees alike to understand.

**Conclusions:** Although an invisible gas, CO<sub>2</sub> insufflation with taTME produces markedly visible effects which are imposed upon the operative field. This can result in anatomic distortion and misperception of operative planes. Thus, practicing taTME surgeons should be cognizant of these effects.