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## Carbon Dioxide Embolism Associated With Transanal Total Mesorectal Excision Surgery: A Report From the International Registries

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### Abstract

**Background:** Carbon dioxide embolus has been reported as a rare but clinically important risk associated with transanal total mesorectal excision surgery. To date, there exists limited data describing the incidence, risk factors, and management of carbon dioxide embolus in transanal total mesorectal excision.

**Objective:** This study aimed to obtain data from the transanal total mesorectal excision registries to identify trends and potential risk factors for carbon dioxide embolus specific to this surgical technique.

**Design:** Contributors to both the LOREC and OSTRiCh transanal total mesorectal excision registries were invited to report their incidence of carbon dioxide embolus. Case report forms were collected detailing the patient-specific and technical factors of each event.

**Settings:** The study was conducted at the collaborating centers from the international transanal total mesorectal excision registries.

**Main outcome measures:** Characteristics and outcomes of patients with carbon dioxide embolus associated with transanal mesorectal excision were measured.

**Results:** Twenty-five cases were reported. The incidence of carbon dioxide embolus during transanal total mesorectal excision is estimated to be  $\approx 0.4\%$  (25/6375 cases). A fall in end tidal carbon dioxide was noted as the initial feature in 22 cases, with 13 (52%) developing signs of hemodynamic compromise. All of the events occurred in the transanal component of dissection, with mean (range) insufflation pressures of 15 mm Hg (12-20 mm Hg). Patients were predominantly (68%) in a Trendelenburg position, between 30° and 45°. Venous bleeding was reported in 20 cases at the time of carbon dioxide embolus, with periprostatic veins documented as the most common site (40%). After carbon dioxide embolus, 84% of cases were completed after hemodynamic stabilization. Two patients required cardiopulmonary resuscitation because of cardiovascular collapse. There were no deaths.

**Limitations:** This is a retrospective study surveying reported outcomes by surgeons and anesthesiologists.

**Conclusions:** Surgeons undertaking transanal total mesorectal excision must be aware of the possibility of carbon dioxide embolus and its potential risk factors, including venous bleeding (wrong plane surgery), high insufflation pressures, and patient positioning. Prompt recognition and management can limit the clinical impact of such events. See Video Abstract at <http://links.lww.com/DCR/A961>.

