

AirSeal system insufflator to maintain a stable pneumorectum during TAMIS

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Abstract Transanal minimally invasive surgery (TAMIS) is typically used for treating intraluminal rectal tumors. Other applications have recently been described. We here present the use of TAMIS as a tool to treat a chronic anastomotic fistula after restorative rectal resection. A new insufflation device expected to solve the problem of maintaining a stable pneumorectum is described.

Keywords Anastomotic leakage · Transanal minimally invasive surgery (TAMIS) · Pneumorectum · AirSeal[®] System Insufflator

Introduction

Transanal minimally invasive surgery (TAMIS) has been developed as a platform to treat intraluminal rectal tumors, instead of the more expensive and sophisticated transanal endoscopic microsurgery (TEM) [1–4]. This platform has also been used to treat other surgical conditions [5]. The main problem with TAMIS is the maintenance of a stable pneumorectum, because a ‘flapping’ bowel wall occurs when a conventional laparoscopic CO₂ insufflator is used. We here report the use of a device that can maintain a

stable pneumorectum during intraluminal TAMIS for the treatment of a chronic anastomotic fistula.

Case report

A 74-year-old man (body mass index 31 kg/m²) was referred to our outpatient clinic with an anastomotic fistula after laparoscopic total mesorectal excision (TME) with a stapled side-to-end coloanal anastomosis. In view of ileostomy closure, the patient underwent anal examination under anesthesia, which revealed a small posterolateral left-sided anastomotic defect 1 cm in diameter. An abdominal computed tomography (CT) scan with transrectal water-soluble contrast excluded the presence of fluid collections. We therefore decided to perform TAMIS to close the anastomotic fistula endoluminally.

Surgical technique

The patient was placed in the lithotomy position under general anesthesia. Prophylactic antibiotics (cefazoline 1 g and metronidazole 1.5 g) were given at induction. A Lone Star Retractor[®] (CooperSurgical, Trumbull, CT, USA) was inserted to optimize the exposure of the anal canal. Subsequently, a Gelpoint path[®] (Applied Medical, Rancho Santa Margarita, CA, USA) was placed into the anal muscular cuff. AirSeal[®] System Insufflator (SurgiQuestInc, Milford, CT, USA) combined with a dedicated access port and tri-lumen filtered tube set were used to insufflate continuous CO₂ to a pressure of 15 mmHg (Video). In Belgium, the insufflator costs 25,000 € excluding value added tax (VAT) and disposables cost 290 € excluding VAT per procedure. A 30° 10-mm “Chip-on-the-Tip”

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Fig. 1 Water-soluble contrast enema showing integrity of side-to-end colorectal anastomosis

laparothoracovideoscope A50002A (Endo-Eye, Olympus Medical Europe Holding GmbH, Hamburg, Germany) was used as optical system. The anastomosis was easily identified. It appeared intact, except for a small defect of about 5 mm at the 4 o'clock position, surrounded by granulation tissue, partially re-epithelialized. Orifice and fistula tract debridement was then performed as well as lavage. There was no drainage of any purulent material. Finally, four simple 2/0 Vicryl[®] resorbable sutures were placed to close the defect. The procedure lasted 60 min. The patient was discharged on postoperative day 2. Postoperative antibiotics (levofloxacin 500 mg and ornidazole 500 mg) were given twice a day for 5 days. No imaging was performed to assess the integrity of the anastomosis. An anal exploration under general anesthesia was performed 7 days and 6 weeks after surgery showing complete healing of the defect. Recently, the ileostomy was closed after water-soluble contrast enema showing no leak (Fig. 1).

Discussion

Transanal minimally invasive surgery, on the basis of the experience acquired with the TEM technique, has earned consensus as a method for the removal of benign or premalignant rectal tumors and early-stage rectal cancers. Recent studies on TAMIS have shown its feasibility and safety [1–3]. Comparable results have been reported comparing TAMIS to TEM in a non-randomized setting [6]. This report shows the use of two devices in a combined effort to improve surgical technique. One of the difficulties

using TAMIS is the creation of a stable pneumorectum. The AirSeal[®] insufflator was used to create a pneumocolon and maintain a steady state. Conventionally, the AirSeal[®] insufflator is used in a laparoscopic setting. The AirSeal[®] system provides high-flow insufflation, continuous pressure sensing, stable pneumoperitoneum, and continuous smoke evacuation throughout the procedure, thanks to a special port (AirSeal[®] Access Port). This port has a series of high-pressure nozzles within the cannula housing that directs a downward CO₂ pressure equal in force to the intraluminal pressure set by the surgeon. The result is a horizontal air barrier that instantaneously responds to changes in intraluminal pressure, either by allowing more CO₂ inflow with pressure drops or by serving as a pressure relief valve during pressure spikes [7]. Because high-pressure continuous-flow circuit insufflation can preserve a stable pneumoperitoneum, we investigated the feasibility of applying this device during TAMIS. We were able to maintain a stable pneumocolon during the entire procedure as shown in the video. Continuous-flow insufflation has been demonstrated to be of major advantage in terms of stability, avoiding bowel wall flapping, and accurate smoke evacuation in this confined environment. Moreover, a single port multi-access platform was used to perform intraluminal surgery. The small anastomotic dehiscence could be repaired under direct vision. Recently, other possible applications have been explored, including repair of rectourethral fistulas, treatment of Dieulafoy lesions, removal of foreign bodies, and drainage of intraperitoneal pelvic abscesses [5]. The present case supports the use of TAMIS as a tool for management of chronic anastomotic dehiscence occurring after TME. The persistence of a small leak, without any remaining sepsis but with the presence of vital surrounding tissue, led us to perform a debridement of the fistula tract, with direct closure leaving defunctioning ileostomy in place. Although we have already had considerable experience with the use of TAMIS in combination with AirSeal[®] System Insufflator to treat benign intraluminal rectal tumors, we selected this particular case to investigate advantages of creating a stable pneumocolon. By creating a stable working space, it was possible to detect, to debride, and to suture the small anastomotic defect. Apart from the traditional instruments, we tested the use of a new insufflation system that allowed us to overcome the problem of the rectal wall “breathing effect” and of the surgical environment instability, mainly due to intermittent CO₂ flow insufflation [7]. The versatility of this platform has allowed the expansion of its use beyond the classic ones of the TEM [5]. This has resulted in the publication of clinical series on the use of TAMIS for transanal TME as a hybrid procedure with laparoscopic assistance or as a pure transanal procedure [8–10].

Conclusions

The use of a continuous-flow insufflator during TAMIS for intraluminal surgery is necessary to maintain a stable working space. It is easily applicable and can be used for every TAMIS procedure. In the future, the use of both devices in TAMIS TME should be explored.

Conflict of interest None.

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