



# Pelvic drain after colorectal anastomosis: useful or useless

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Strategies for rectal cancer surgery have been evolved and total mesorectal excision (TME) now becomes a standard treatment for middle to low rectal cancer (1). In suitable cases, surgeon will perform bowel restoration after rectal removal with TME because patient with sphincter-saving operation had a better quality of life than those with abdominoperineal excision (2). However, TME has been shown to be associated with high anastomotic leakage, particularly in those receiving neoadjuvant chemoradiation (3). According to the definition of anastomotic leakage proposed by the International Study Group of Rectal Cancer in 2010, anastomotic leakage is defined as a defect of the intestinal wall at the anastomotic site—including suture and staple lines of neorectal reservoirs which leads to a connection between intraluminal compartment and extraluminal compartment (4).

Since the pelvic cavity is a fix and dependent non-peritonized space, a fluid collection in this area after rectal dissection is possible. Some surgeons have advocated to use prophylactic pelvic drain because they believe that fluid collection in the pelvis could be a potential source of contamination and thereby weakening anastomotic integrity and healing. Meanwhile pelvic drain may help detecting anastomotic leakage and may reduce risk of reoperation. Recently, the French Research Group of Rectal Cancer Surgery conducted a large, multicenter, open-label, randomized superiority phase III clinical trial comparing pelvic drainage after infraperitoneal anastomosis after rectal excision for cancer to no pelvic drainage, named the GRECCAR 5 randomized trial (5). The primary endpoint of the study was postoperative pelvic sepsis within 30 postoperative days including anastomotic leakage, pelvic abscess and peritonitis. Secondary endpoints

were postoperative morbidities, rate of reoperation, length of hospitalization and rate of stoma closure at 6 months. Comparing 236 with drain and 233 without, there was no significant difference in the rate of postoperative pelvic sepsis (16.1% *vs.* 18.0%;  $P=0.58$ ). There was also no difference in postoperative morbidities (18.7% *vs.* 25.3%;  $P=0.83$ ), rate of reoperation (16.6% *vs.* 21.0%;  $P=0.22$ ), length of hospitalization (12.2 *vs.* 12.2 days;  $P=0.99$ ) and rate of stoma closure (80.1% *vs.* 77.3%;  $P=0.53$ ) between the two groups.

Of note, 73% of patients enrolled in the GRECCAR 5 trial received neoadjuvant chemoradiation and average anastomotic height was 3.5 cm from the anal verge. Ninety four percent underwent laparoscopic surgery and 76% had diverting stoma. It is worth noting that 27 patients (12%) in arm without drain finally had suction pelvic drain because of pelvic bleeding, difficult TME, or surgeon's misinterpretation of randomization. As stated in the protocol, suction pelvic drain was placed behind the anastomosis in the presacral area and was removed when the drain output was clear and less than 100 mL per day. In average, pelvic drain was removed on 5.6 days postoperatively and the diagnosis of pelvic sepsis was documented on 7.8 days after an operation.

Similar to other prospective studies, including a large multicenter study by French association for surgical research in 1999, with a total sample size of 653 (6-8), the GRECCAR 5 trial of 494 patients clearly showed that pelvic drain did not decrease the incidence of pelvic sepsis and anastomotic leakage. On the other hand, many studies indicated that pelvic drain was associated with an increased risk of anastomotic dehiscence. For example, a

review of 1,014 patients with stapled colorectal anastomosis from the Cleveland Clinic, Ohio, USA noted an increased rate of anastomotic leakage in those with pelvic drain (9). Another review of 978 patients undergoing anterior resection for primary rectal cancer in Taiwan found that an irrigation-suction drain was an independent risk factors for anastomotic leakage [odds ratio of 9.13; 95% confidence interval (CI): 1.16–71.76] (10). Therefore, a prophylactic placement of pelvic drain after colorectal anastomosis is not justified and should be discouraged because it does not reduce the incidence of anastomotic leakage and, in fact, it may increase risk of anastomotic dehiscence. However, it is difficult to determine whether type of pelvic drain is related to colorectal anastomotic leakage because there are a large number of drains used in the literature such as irrigation-suction drain, closed-suction drain and Penrose drain.

In a view of enhanced recovery after surgery (ERAS) protocol (11,12), pelvic drain should not be used routinely as it may cause patient discomfort and prolong hospitalization (13). Drain itself is also a potential site of infection especially if open or passive drainage system is used. From a single-center prospective study of 2,809 patients undergoing open elective colorectal excision, presence of drain was one of significant risk factors for developing surgical site infection (14).

Since pelvic drain seems to be not beneficial (or even harmful) to the development of colorectal anastomotic leakage and surgical site infection, many surgeons refrain from using pelvic drain but still perform diverting stoma to prevent or minimize such a potentially fatal complication. A recent meta-analysis of 13 studies including 8,002 patients undergoing intraperitoneal colorectal anastomosis indicated that diverting stomas significantly reduced the rate of anastomotic leakage and reoperation with the pooled risk ratios of 0.47 (95% CI: 0.33–0.68) and 0.36 (95% CI: 0.28–0.46), respectively (15). However, a diverting stoma itself was a significant risk factor for permanent stoma (16). Thus, diverting stoma should be performed selectively in those with at high risk of leakage e.g., those with difficult pelvic dissection, those receiving neoadjuvant chemoradiation, and those with coloanal anastomosis. Both diverting stoma and pelvic drainage might be unnecessary if surgeons achieve an overall leak rate below 8% (17). A review of 170 sphincter-saving operations from a university hospital in Thailand showed that the operation can be performed safely in the vast majority of rectal cancer patients without a diverting stoma and pelvic drain (18). Tumor height within 5 cm from the anal verge was an independent risk factor for

anastomotic leakage.

Another possible rationale of using pelvic drain after TME is to detect leakage and to reduce a need of re-laparotomy. However, the GRECCAR 5 randomized trial failed to show any advantage of pelvic drain on these purposes. One explanation is that the sensitivity of pelvic drain in detecting anastomotic leakage was modest (between 5% and 71%) (19,20), which was mainly dependent on the location of drain and timing of drain removal. Although colorectal anastomotic leakage typically and clinically appeared on postoperative day 4<sup>th</sup> to 8<sup>th</sup>, it may present as late as on postoperative day 20<sup>th</sup> or beyond (21,22). As reported in the GRECCAR 5 randomized trial that the diagnosis of pelvic sepsis was documented on approximately 8 days after an operation but pelvic drain was earlier removed on postoperative day 6<sup>th</sup>, the beneficial effect of pelvic drain in detecting leakage and reducing reoperation may not be seen.

Recently, new concepts of pelvic drain have been proposed as diagnostic tool for detecting “early” anastomotic leakage using intraperitoneal cytokines and biomarkers. Using intraabdominal exudate obtained from drain, two exploratory studies showed a significant rise in intraperitoneal interleukin-1, interleukin-6 and tumor necrosis factor- $\alpha$  level in patients developing symptomatic anastomotic leakage before clinical symptoms were evident (23,24). Meanwhile, a high intraperitoneal lactate/pyruvate ratio may be an additional biomarker of “early” intraabdominal complication after colorectal surgery (23). An elevated level of intraperitoneal matrix metalloproteinases-8 and -9 was evident as early as 4 hours after rectal cancer surgery in those developing anastomotic leakage (25). Future studies should focus on preclinical detection of anastomotic leakage using such intraperitoneal cytokines and biomarkers from pelvic drain i.e., periodical fluid collection rather than observation of drain content. On condition that several and large studies show consistent and positive results, the driving effect of pelvic drain to detect early anastomotic leakage may become reality and could be applied into daily clinical practice.

In conclusion, based on the published literature, the author believes that there has not been sufficient evidence to use pelvic drain after colorectal anastomosis. In cases pelvic drain is required such as difficult pelvic dissection, massive intraoperative bleeding and surgery beyond TME planes, pelvic drain other than irrigation-suction should be considered. Future studies should focus on preclinical detection of anastomotic leakage using biomarkers of

intraperitoneal fluid from drain (if any).

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