



Review article

Mechanical Bowel Preparation and Oral Antibiotic Prophylaxis in Colorectal Surgery: Analysis of Evidence and Narrative Review[☆]

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A B S T R A C T

The role of oral antibiotic prophylaxis and mechanical bowel preparation in colorectal surgery remains controversial. The lack of efficacy of mechanical preparation to improve infection rates, its adverse effects, and multimodal rehabilitation programs have led to a decline in its use. This review aims to evaluate current evidence on antegrade colonic cleansing combined with oral antibiotics for the prevention of surgical site infections. In experimental studies, oral antibiotics decrease the bacterial inoculum, both in the bowel lumen and surgical field. Clinical studies have shown a reduction in infection rates when oral antibiotic prophylaxis is combined with mechanical preparation. Oral antibiotics alone seem to be effective in reducing infection in observational studies, but their effect is inferior to the combined preparation. In conclusion, the combination of oral antibiotics and mechanical preparation should be considered the gold standard for the prophylaxis of postoperative infections in colorectal surgery.

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Preparación mecánica y profilaxis antibiótica por vía oral en cirugía colorrectal. Análisis de la evidencia científica y revisión narrativa

R E S U M E N

El papel de la profilaxis antibiótica oral y la preparación mecánica de colon en cirugía colorrectal es controvertido. La falta de eficacia del lavado mecánico para disminuir la infección, sus efectos indeseables y los programas de rehabilitación multimodal han reducido su uso. Esta revisión pretende evaluar la evidencia actual sobre la preparación mecánica anterógrada combinada con el antibiótico oral en la prevención de la infección de localización quirúrgica. En estudios experimentales, los antibióticos orales disminuyen el inóculo intraluminal y en los tejidos intervenidos. Los estudios clínicos muestran disminución de la infección con la profilaxis oral combinada con preparación mecánica. La

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administración de antibiótico oral en ausencia de limpieza mecánica del colon parece tener eficacia en estudios observacionales, pero su efecto es inferior a la preparación combinada. En conclusión, la preparación oral combinada mecánica y antibiótica debería considerarse el gold estándar de la profilaxis de la infección postoperatoria en cirugía colorrectal.

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Surgical site infections (SSI) are the most frequent postoperative complications and the first cause of infection related to medical institutions in Spain (21.6%)¹ and in Europe (19.6%).² Colorectal surgery has the highest associated SSI rate of abdominal surgeries, with figures that can reach 20% in incidence studies with 30-day postoperative follow-ups.³⁻⁵

SSI represent an important financial burden for the national healthcare system, with increased consumption of antibiotics and longer mean hospital stay.⁶ Organ/space SSI (SSI-o/s) in colorectal surgery triples hospital stay and is associated with a 23% rate of readmissions, 60% reoperations and 29% need for intensive care.⁷

The etiopathogenesis of incisional SSI (superficial or deep) and that of SSI-o/s in colon and rectal surgery are probably different given the influence of suture dehiscence in the latter; therefore, their prevention strategies could be also different. Among the numerous measures proposed for the prevention of SSI in surgery,⁸ some are exclusive for colorectal surgery. These include mechanical bowel preparation (MBP) and oral antibiotic prophylaxis. Although there is broad consensus that antibiotic prophylaxis is essential before colorectal surgery, it is still debated whether antibiotics should be administered only systemically or through a combination of oral and intravenous therapies. On the other hand, the role of MBP and the option of performing it with or without oral antibiotics has been widely discussed.⁹⁻¹¹

For the last two decades, the development of multimodal rehabilitation programs in colorectal surgery¹² and the publication of numerous studies have fueled this controversy, leading to the re-evaluation of the indication of MBP and oral antibiotics in patients undergoing elective colon or rectal surgery.^{13,14} The aim of the present review was to analyze the current evidence on the combination of MBP and oral antibiotics or the use of antibiotics alone in the prevention of SSI.

Methods

We carried out a narrative review of the literature through PubMed and the following platforms: Tripdatabase, National Guideline Clearinghouse and The Cochrane Library. We also consulted the websites of the Centers for Diseases for Control and Prevention, the European Center for Diseases for Control and Prevention, The National Institute of Health and Clinical Excellence, The Canadian Patient Safety Institute, The Society for Healthcare Epidemiology of America, the Infectious Diseases Society of America and The National Health Service Scotland. For the bibliographic search, MeSH terminology was used under the topics: postoperative

complications; surgical wound infection; anastomotic leak; prevention and control; and antibiotic prophylaxis. Additional searches were developed using the terms: colorectal surgery; oral antibiotic prophylaxis; mechanical colon preparation; mechanical colon cleansing; and surgical site infection. The inclusion criteria were: clinical practice guidelines, controlled clinical studies, cohort studies, meta-analyses, and systematic reviews. The bibliographic search was carried out by a single researcher. The review of the selected documents and the inclusion decision was made by the two researchers.

Results

Mechanical Colon Preparation

MBP became popular in the 1930s with the intention of reducing the colon fecal content and bacterial inoculum in the tissues during operative manipulation or as a consequence of a suture dehiscence¹⁵ (Fig. 1). However, experimental studies pointed out that MBP alone did not obtain a decrease in the bacterial content of the colon¹⁶ and began to investigate the effect of adding oral antibiotics to the preparation.¹⁷ In 1971, Nichols and Condon experimentally demonstrated that the addition of nonabsorbable oral antibiotics (kanamycin and erythromycin base) to MBP reduced fecal aerobic and anaerobic flora.¹⁸ In 1977, in a randomized clinical study (RCT) without systemic antibiotics comparing oral antibiotic and placebo, the same authors correlated the bacterial reduction obtained by oral antibiotics with a lower rate of postoperative SSI.¹⁹ In spite of confirming the effect of oral prophylaxis, it was considered that the combination with MBP was necessary to reduce the fecal mass and, in theory, the bacterial inoculum of the intestinal lumen.

Subsequently, an RCT²⁰ compared intravenous prophylaxis against oral prophylaxis and demonstrated the superiority of the former, universalizing systemic prophylaxis in colorectal surgery. Since the 1980s, intravenous prophylaxis continued to be used in combination with oral antibiotics in the United States and Canada, while oral prophylaxis was gradually abandoned in Europe.

The definitive decline of oral antibiotics began at the beginning of the 21st century, when several RCT compared MBP against non-preparation while maintaining systemic antibiotic prophylaxis in the two study arms.^{20,21} It demonstrated that omitting MBP did not increase complications in colon and rectal surgery. In addition, severe complications associated with MBP were described, such as electrolyte imbalances, seizures or spontaneous esophageal rupture.²³

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