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International survey on the management of colorectal trauma and alignment with current guidelines

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Colorectal trauma management remains variable worldwide. This study evaluated contemporary practice patterns using an anatomically stratified international survey. An anonymous, electronic survey assessing contemporary colorectal trauma management was distributed internationally through social media platforms and professional surgical societies to capture current practice patterns and variations in clinical decision-making. A total of 280 surgeons from 59 countries responded. For hemodynamically stable intraperitoneal colorectal injuries, 196/280 (70.00%) selected resection, when indicated, with primary repair or anastomosis, and routine colostomy was avoided by 227/280 (81.07%). Routine colostomy use differed by professional training ($p = 0.018$), with higher rates among general surgery residents (13/31, 41.94%) compared with attending trauma surgeons (17/107, 15.89%) and attending colorectal surgeons (5/42, 11.90%). Differences were also observed by hospital type ($p = 0.037$), with higher use in non-academic public general hospitals (10/35, 28.57%) and no routine use in Level II trauma centers (0/18, 0.00%). In hemodynamically unstable intraperitoneal colorectal injuries, colostomy was reported by 148/280 (52.86%). Colostomy reversal was most commonly scheduled between 3 and 6 months (146/280, 52.14%), without differences by training level or hospital type. Reported management of hemodynamically stable intraperitoneal colorectal injuries is predominantly colostomy-sparing, whereas reported approaches for unstable intraperitoneal injuries show mixed diversion practices. Differences by professional training and hospital type suggest persistent variability in contemporary colorectal trauma decision-making.

Keywords Colorectal injuries, Colon trauma, Rectal trauma, Colostomy, Damage control surgery, Fecal diversion, Practice guidelines, International survey

The management of colorectal trauma has progressively shifted from historically dogmatic, diversion-based strategies toward individualized, physiology-driven decision-making. Contemporary evidence demonstrates that routine fecal diversion is no longer justified for most colonic injuries, particularly in hemodynamically stable patients, with primary repair or resection and anastomosis achieving comparable or superior outcomes in terms of infectious complications, morbidity, and length of stay [1–3].

Current trauma guidelines emphasize the importance of anatomical distinction when managing colorectal injuries. Colonic and intraperitoneal rectal injuries are generally approached using similar principles, with management guided by physiological status, degree of contamination, and the need for damage-control laparotomy rather than by injury laterality or mechanism alone [1–3]. These recommendations are further supported by the updated American Association for the Surgery of Trauma (AAST) Organ Injury Scale, which incorporates operative, imaging, and pathologic criteria to better characterize injury severity and support clinical decision-making in colon trauma [4,5].

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In contrast, the management of extraperitoneal rectal injuries remains less clearly defined. While historical practices derived largely from military experience advocated routine proximal diversion, presacral drainage, and distal rectal washout, contemporary civilian data suggest that these adjunctive maneuvers do not confer benefit and may be associated with increased complications [2,6]. As a result, current guidelines recommend selective fecal diversion based on patient physiology and injury characteristics, while discouraging routine use of presacral drainage and distal washout [2,3].

Despite the availability of consensus guidelines, it remains unclear how consistently these recommendations have been adopted across different practice environments. Variability in surgeon training, institutional resources, and trauma system organization may continue to influence clinical decision-making in colorectal trauma, particularly for extraperitoneal rectal injuries. The present study aimed to evaluate contemporary management preferences for colonic, intraperitoneal rectal, and extraperitoneal rectal trauma through an international survey based on standardized clinical scenarios, with a specific focus on variations associated with surgeon training level and hospital type.

Study design

An anonymous electronic survey composed of 26 questions (Supplementary Fig. 1 - provided after references) was distributed to surgeons working in different parts of Latin America and worldwide using social media platforms (WhatsApp and LinkedIn), as well as to members of the World Society of Emergency Surgery, the Brazilian Society of Trauma, and the Panamerican Trauma Society networks. The survey collected information regarding surgical preferences in the management of colorectal trauma scenarios.

The study stratified the results by training level and hospital type. Respondents self-identified their level of training as General Surgery Resident, Trauma Fellows (after formal post-residency in general surgery training in trauma and acute care surgery), Attending General Surgeon, Attending Trauma Surgeon, or Attending Colorectal Surgeon. This is an IRB-exempted study by the University of Maryland, Baltimore IRB (reference # HP-00115419).

Statistical analysis

An anonymous electronic survey composed of 26 questions (Supplementary Fig. 1) was distributed to surgeons working in different parts of Latin America and worldwide using social media platforms (WhatsApp and LinkedIn), as well as to members of the World Society of Emergency Surgery, the Brazilian Society of Trauma, and the Panamerican Trauma Society networks. The survey collected information regarding surgical preferences in the management of colorectal trauma scenarios. Survey options regarding resection, anastomosis, and drainage included the qualifier "if necessary" to reflect real-world clinical decision-making. This term was intentionally left without a rigid definition, as the perceived necessity for these interventions may depend on multiple factors, including injury severity, physiological status, mechanism of trauma, associated injuries, and surgeon judgment. While this approach increases external validity, it also introduces heterogeneity in responses.

Results

Respondent and practice setting characteristics

A total of 280 surgeons participated in the study. Most respondents were attending surgeons (240/280, 85.71%), including trauma surgeons (107/280, 38.21%), general surgeons without formal trauma training (91/280, 32.50%), and colorectal surgeons (42/280, 15.00%), with smaller proportions of general surgery residents (31/280, 11.07%) and trauma fellows or residents (9/280, 3.21%). Nearly half of participants reported practicing in academic public hospitals (135/280, 48.21%), and 68/280 (24.29%) worked in Level I or Level II trauma centers. General surgeons were most commonly responsible for the management of colorectal trauma cases (219/280, 78.21%), while the availability of trauma surgeons (90/280, 32.14%) and colorectal surgeons (118/280, 42.14%) varied across institutions (Table 1).

Intraperitoneal colorectal injuries

Hemodynamically stable patients

In hemodynamically stable patients with intraperitoneal colorectal injuries, the most frequently selected management strategy was resection when indicated followed by primary repair or anastomosis with cavity drainage, reported by 196/280 respondents (70.00%) (Supplementary Table 1). An additional 73/280 respondents (26.07%) favored resection and primary repair without drainage. Routine fecal diversion was generally avoided in this setting, with 227/280 surgeons (81.07%) indicating that colostomy would not be performed as a standard approach in stable patients (Supplementary Table 2). Factors influencing operative decision-making reported in free-text responses are summarized in the Supplementary Material (Supplementary Table 3).

Hemodynamically unstable patients

In hemodynamically unstable patients with intraperitoneal colorectal injuries, resection without immediate anastomosis as part of a damage control approach was the most frequently reported strategy, selected by 228/280 respondents (81.43%) (Supplementary Table 4). Resection followed by primary repair with cavity drainage was reported by 38/280 respondents (13.57%), while resection followed by primary repair without drainage was reported by 6/280 respondents (2.14%).

Routine fecal diversion was not uniformly adopted in this setting, with 148/280 surgeons (52.86%) indicating that colostomy would be routinely performed, while 132/280 (47.14%) would not (Supplementary Table 5). Factors cited as indications for fecal diversion in free-text responses are summarized in the Supplementary Material (Supplementary Tables 6–7).

Characteristic	*n*	%
Professional role		
Resident of General Surgery	31	11.07
Fellow/Resident of Trauma	9	3.21
Attending General Surgeon (no formal trauma training)	91	32.50
Attending Trauma Surgeon (formal training)	107	38.21
Attending Colorectal Surgeon	42	15.00
Hospital characteristics		
Private hospital	18	6.43
General non-academic public hospital	35	12.50
Academic public general hospital	135	48.21
Level I Trauma Center	50	17.86
Level II Trauma Center	18	6.43
Level III Trauma Center	24	8.57
*Resources and personnel available**		
General surgeons cover all cases	219	78.21
Surgical residents available	145	51.79
Colorectal surgeons available if needed	118	42.14
Medical students available	118	42.14
Trained trauma surgeons available	90	32.14
Surgical fellows available	73	26.07

Table 1. Respondent and practice setting characteristics. *Multiple responses were allowed for resources and personnel availability

Intraperitoneal rectal injuries

For destructive intraperitoneal rectal injuries in hemodynamically stable patients, management strategies were divided. Primary resection and anastomosis without fecal diversion was reported by 145/280 respondents (51.79%), whereas resection with anastomosis associated with proximal colostomy was selected by 135/280 (48.21%) (Supplementary Table 8).

In cases of intraperitoneal rectal gunshot wounds involving a single rectal wall, most respondents reported considering a protective colostomy, selected by 216/280 surgeons (77.14%) (Supplementary Table 9).

When fecal diversion was selected for rectal injuries, proximal loop colostomy was the preferred option, reported by 153/280 respondents (54.64%), followed by terminal proximal colostomy (67/280, 23.93%) and loop ileostomy (56/280, 20.00%) (Supplementary Table 10).

Extraperitoneal rectal injuries

Flexible rectosigmoidoscopy was the most commonly available diagnostic tool for evaluation of the extraperitoneal rectum, reported by 200 respondents (71.43%), followed by proctoscopy in 135 cases (48.21%) and rigid rectosigmoidoscopy in 115 (41.07%) (Supplementary Table 11).

In non-destructive extraperitoneal rectal injuries, diversion-based strategies predominated when transanal repair was not feasible. Loop colostomy was selected in 121 cases (43.21%) and terminal colostomy in 61 (21.79%), while primary transanal repair was chosen in 65 cases (23.21%) (Supplementary Table 12).

Adjunctive practices were applied selectively rather than routinely. Presacral drainage was reported as always used by 52 respondents (18.57%) and distal rectal washout by 95 (33.93%), whereas non-operative management without colostomy was considered acceptable in selected non-destructive stab wounds by 101 respondents (36.07%) (Supplementary Tables 13–15).

Stoma reversal and follow-up practices

Stoma reversal was most frequently scheduled between 3 and 6 months after the index operation, as reported by 146 respondents (52.14%), while reconstruction within 1–3 months was reported by 87 respondents (31.07%) (Supplementary Table 16).

Reconstruction was most commonly performed by the same surgical team responsible for the initial procedure, reported by 206 respondents (73.57%), followed by referral to colorectal surgery services in 67 cases (23.93%) (Supplementary Table 17).

Estimated reconstruction rates varied, with most respondents reporting that between 51% and 75% of patients underwent reversal (98 respondents, 35.00%) or between 76% and 99% (95 respondents, 33.93%) once clinically fit (Supplementary Table 18).

Comparisons by surgeon category and hospital type

By professional training

Among hemodynamically stable patients with intraperitoneal colorectal injuries, routine colostomy use differed across professional training categories ($p = 0.018$). Higher use was reported among general surgery residents

(13/31, 41.94%), whereas lower proportions were observed among attending trauma surgeons with formal training (17/107, 15.89%) and attending colorectal surgeons (5/42, 11.90%) (Supplementary Table 19).

In hemodynamically unstable patients, routine use of colostomy also varied by professional training ($p < 0.001$). The highest reported use occurred among general surgery residents (25/31, 80.65%), while lower proportions were reported among trauma surgery fellows or residents (2/9, 22.22%) and attending trauma surgeons with formal training (44/107, 41.12%) (Supplementary Table 19).

Use of presacral drainage differed across training categories ($p = 0.008$). Routine use ("always") was reported by attending trauma surgeons with formal training (15/107, 14.02%) and attending colorectal surgeons (6/42, 14.29%), while selective use ("occasionally") predominated, including 43/91 (47.25%) among attending general surgeons without formal trauma training and 30/42 (71.43%) among attending colorectal surgeons (Supplementary Table 19).

The reported timing of stoma reconstruction did not differ significantly among training categories ($p = 0.213$), with reconstruction most commonly scheduled between 3 and 6 months across all professional groups (Supplementary Table 19).

By hospital type

Among hemodynamically stable patients with intraperitoneal colorectal injuries, routine colostomy use differed significantly across hospital types ($p = 0.037$). Higher use was reported in non-academic public general hospitals (28.57%) and academic public general hospitals (23.70%), whereas no routine use was reported in Level II trauma centers (0.00%) (Supplementary Table 20).

In contrast, routine colostomy use in hemodynamically unstable patients did not differ significantly by hospital type ($p = 0.154$), with reported use of 40.00% in Level I trauma centers and 68.57% in non-academic public general hospitals (Supplementary Table 20).

Use of presacral drainage varied significantly across hospital settings ($p = 0.002$). Routine use ("always") was least frequently reported in Level I trauma centers (6.00%) and most frequently reported in Level III trauma centers (29.17%), while non-use ("never") was most common in Level I trauma centers (56.00%) (Supplementary Table 20).

The reported timing of stoma reconstruction did not differ according to hospital type ($p = 0.912$), with reconstruction most commonly scheduled between 3 and 6 months across all settings (Supplementary Table 20).

Discussion

This study provides a contemporary, international overview of current practices in the management of colorectal trauma and reveals important areas of convergence and divergence between real-world decision-making and published guidelines. By deliberately separating colonic injuries, intraperitoneal rectal injuries, and extraperitoneal rectal injuries in both the survey structure and the results analysis, the present work addresses a long-standing source of ambiguity in trauma literature and allows a more anatomically coherent interpretation of practice patterns.

For intraperitoneal colorectal injuries in hemodynamically stable patients, the reported management strategies demonstrate substantial alignment with modern trauma recommendations. Lower rates of routine fecal diversion among trauma-trained surgeons and colorectal surgeons are consistent with the progressive shift toward primary repair or resection with anastomosis in appropriately selected patients, as supported by contemporary guidelines and organ injury grading systems [1,2,4,6]. This consistency suggests that, when injury patterns and physiologic status are clearly defined, evidence-based principles have been successfully translated into daily practice across diverse clinical settings.

In contrast, management strategies in hemodynamically unstable patients remain more heterogeneous. Although higher rates of fecal diversion in this subgroup are expected and consistent with damage-control principles, the wide variation observed across professional training categories suggests that clinical judgment and institutional culture continue to play a major role. Current guidelines emphasize physiologic derangement, contamination, and associated injuries rather than hemodynamic status alone when determining the need for diversion [1–3]. The variability observed in our results highlights the ongoing challenge of operationalizing these recommendations in time-critical scenarios, particularly in environments with differing levels of trauma specialization.

Extraperitoneal rectal injuries represent the most heterogeneous domain of colorectal trauma management identified in this survey. Diagnostic approaches varied considerably, with flexible rectosigmoidoscopy commonly available but not universally employed, reflecting differences in institutional resources and clinical pathways. More importantly, the use of adjunctive measures such as presacral drainage and distal rectal washout showed marked variability, with many respondents reporting selective use or complete abandonment of these historical practices. This pattern mirrors the evolving literature, which increasingly questions the routine application of these interventions in the absence of compelling evidence of benefit [3,6].

Notably, a substantial proportion of respondents reported scenarios in which minor extraperitoneal rectal injuries were managed without fecal diversion or operative intervention. This finding underscores a gradual shift toward selective management based on anatomy and injury severity, but also exposes the lack of high-quality prospective data to guide such decisions. Unlike intraperitoneal injuries, where consensus has largely emerged, extraperitoneal rectal trauma remains a true clinical gray zone, with practice shaped by surgeon experience, perceived risk tolerance, and local protocols rather than definitive evidence.

Differences in management according to professional training were consistently observed across several domains. General surgery residents reported higher rates of routine colostomy use in both hemodynamically stable and unstable patients. In stable intraperitoneal injuries, trauma-trained and colorectal surgeons more frequently adopted selective or restorative approaches. In contrast, in hemodynamically unstable patients,

routine colostomy use increased across all training categories, and colorectal surgeons reported higher use than trauma surgeons with formal training. These findings likely reflect the absence of absolute consensus in specific clinical scenarios rather than deficiencies in training or practice. Given the survey design, it is not possible to determine the underlying reasons for these variations, including the relative contributions of clinical exposure, institutional context, or individual decision-making thresholds. Importantly, these findings should be interpreted as illustrating how surgical decision-making adapts under conditions of uncertainty, within the framework of current guideline principles that favor selective repair or anastomosis over routine diversion when physiologic and injury-related criteria are met [1,2,6].

Hospital type also influenced selected management practices, particularly in hemodynamically stable patients and in the use of presacral drainage. Higher diversion rates in non-academic and academic public general hospitals compared with trauma centers indicate differences in practice patterns across institutional settings. Conversely, the lower use of presacral drainage in Level I trauma centers aligns with the increasing skepticism toward this practice in modern guidelines [3].

Despite these variations in initial management, the timing of stoma reconstruction was remarkably consistent across surgeon categories and hospital types. It should be acknowledged that, in trauma patients, the timing of stoma reversal may also be influenced by factors not captured in this survey, such as the burden of associated injuries, the need for abdominal wall reconstruction, prolonged orthopedic rehabilitation, or patient-specific functional considerations. Most respondents favored reversal within 3 to 6 months once patients were clinically fit, suggesting a shared pragmatic approach that transcends differences in training and institutional context. This consistency likely reflects the common challenges faced by trauma patients, including prolonged recovery, associated injuries, and the need for global physiologic optimization prior to reconstruction.

Taken together, these findings illustrate that colorectal trauma management has largely evolved beyond rigid dogma, particularly for colonic and intraperitoneal rectal injuries. However, substantial variability persists in areas where evidence remains limited, most notably in extraperitoneal rectal trauma. By capturing these practice patterns on a global scale, this study provides a realistic snapshot of current decision-making and highlights specific domains where further evidence and clearer guidance are urgently needed.

Future perspectives

The findings of this study highlight important opportunities to advance the understanding and management of colorectal trauma. The persistent variability observed in the management of extraperitoneal rectal injuries indicates a clear need for prospective, multicenter investigations focused on this anatomical subgroup. Future studies may help clarify which patients benefit most from fecal diversion, presacral drainage, or non-operative management, particularly when guided by standardized injury grading systems and clinically meaningful outcomes.

The differences observed according to professional training and hospital type also suggest that variability in care may reflect differences in exposure, experience, and institutional context. Future research exploring implementation strategies and knowledge translation may help improve consistency in practice, particularly in settings with lower trauma volume or limited subspecialty support.

Finally, future guideline development may benefit from explicitly addressing the areas of uncertainty identified in this survey, including the role of adjunctive procedures in extraperitoneal rectal injuries and the criteria supporting selective non-diversion. Greater alignment between guideline recommendations and real-world practice patterns may facilitate broader adoption and improve applicability across diverse healthcare environments.

Limitations

This study has several limitations that should be considered when interpreting its findings. The survey-based design relies on self-reported practices, which may not fully reflect actual clinical behavior and may be subject to recall or reporting bias. Hospital type categories were self-identified and not mutually exclusive, which may not fully capture the complexity or overlap of institutional roles in trauma care and may have introduced misclassification.

In addition, the survey did not allow individual-level linkage between surgeon characteristics and hospital type, precluding direct assessment of how professional training and institutional setting interact in shaping management decisions. As a result, it was not possible to determine whether specific surgeon groups were predominantly based in particular hospital settings within this cohort, nor to adjust for potential confounding between professional training and institutional context. Several survey questions intentionally allowed subjective interpretation, such as the use of operative strategies "if necessary," in order to reflect real-world decision-making. While this approach enhances ecological validity, it may reduce the granularity and comparability of responses across participants.

The absence of patient-level clinical data and outcomes limits the ability to directly evaluate the impact of specific management strategies on morbidity, mortality, or long-term functional results. As a result, factors known to affect stoma reversal in trauma patients, including associated orthopedic injuries, complex abdominal wall defects, prolonged rehabilitation, or patient preference to defer or forego reversal, could not be evaluated. Although the international scope of the survey represents a major strength, regional differences in trauma systems, resource availability, and training structures may influence responses and limit generalizability to specific healthcare settings.

Conclusion

This international survey suggests that contemporary practice patterns are broadly consistent with current evidence for colonic and intraperitoneal rectal injuries, particularly in hemodynamically stable patients. In

contrast, substantial variability persists in the management of extraperitoneal rectal injuries, reflecting ongoing uncertainty and limited high-quality evidence to guide decision-making. Differences according to surgeon training and hospital type further illustrate the influence of experience and institutional context on therapeutic choices. Together, these findings highlight areas of relative consensus as well as persistent gaps in evidence, underscoring the need for focused prospective research to better inform clinical decision-making and future refinement of guideline recommendations in colorectal trauma.

Data availability

Available from the corresponding author upon reasonable request. This study did not generate or analyze any datasets beyond the anonymous survey responses.

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References

1. Cullinane, D. C. *et al.* Management of penetrating intraperitoneal colon injuries: A meta-analysis and practice management guideline from the Eastern Association for the Surgery of Trauma. *J Trauma Acute Care Surg* **86**, 505–515 (2019).
2. Biffl, W. L. *et al.* Management of colorectal injuries: A Western Trauma Association critical decisions algorithm. *J Trauma Acute Care Surg* **85**, 1016–1020 (2018).
3. Smyth, L. *et al.* WSES guidelines on blunt and penetrating bowel injury: diagnosis, investigations, and treatment. *World J Emerg Surg* **17**, 13 (2022).
4. Tominaga, G. T. *et al.* Organ Injury Scaling 2020 update: Bowel and mesentery. *J Trauma Acute Care Surg* **91**, e73–e77 (2021).
5. Zeineddin, A. *et al.* Contemporary management and outcomes of penetrating colon injuries: Validation of the 2020 AAST Colon Organ Injury Scale. *J Trauma Acute Care Surg* **95**, 213–219 (2023).
6. Brown, C. V. R. *et al.* Contemporary management of rectal injuries at Level I trauma centers: The results of an American Association for the Surgery of Trauma multi-institutional study. *J Trauma Acute Care Surg* **84**, 225–233 (2018).

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Author contributions

MAFRJ and TS participated in the study conception, MAFRJ and NW collected the data and performed the statistical analysis, MAFRJ, NW, JW and RDP drafted the manuscript, MAFRJ, RDP, DE, RK, JW and FC contributed to revise the manuscript.

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Declarations

Competing interests

The authors declare no competing interests.

Ethical approval

This study involved an anonymous, voluntary online survey distributed to practicing surgeons worldwide. Participation required explicit consent, as each respondent was presented with the statement: "The data obtained through this form will be used for research purposes. Do you authorize their use?" Only individuals who selected "Yes" were able to proceed with the questionnaire. All 280 respondents provided informed consent. No identifying personal or institutional information was collected. The study was conducted in accordance with the ethical standards of the Declaration of Helsinki and was exempted from review by the Institutional Review Board of the University of Maryland, Baltimore (IRB reference #HP-00115419).

Consent for publication

All participants were aware of the nature of the study and consented for publication at the end of the questionary.

Additional information

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