

Underdiagnosed intestinal perforation in a patient with spinal cord injury. A case report

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Case Report

General Surgery



Background

Patients with spinal cord injury present neurogenic bowel, a situation that is aggravated by the use of drugs commonly used in this pathology that affect intestinal function with decreased compliance, abnormal myoelectric activity, slowing of colonic transit and abdominal distension, ileus is a clinical manifestation non-specific that requires a search for differential diagnoses. There are multiple complications due to acute abdomen because there are no usual clinical manifestations. Mechanical obstruction and megacolon secondary to *Clostridium difficile* infection should be ruled out and early signs of ischemia or perforation should be sought, the two main complications of this syndrome. Early diagnosis and proper management are essential to minimize morbidity and mortality. The approach to intestinal treatment in the patient with spinal injury must bord specific issues such as fecal incontinence, constipation, and functional mobility. Late diagnosis leads to a higher mortality rate among patients with spinal cord injuries. A narrative review was carried out including a clinical case, management guidelines, protocols and relevant reviews, and an approach is provided from the point of view of surgery and critical medicine for the initial approach to this pathology.

Keywords: Spinal cord injury; Acute abdomen; ileus; megacolon; ischemia; drilling; fecal incontinence; constipation; functional mobility.

The annual incidence of spinal cord injury varies between 11.5 and 53.9 cases per million inhabitants. In the United States, between 10,000 and 12,000 new cases of quadriplegia or paraplegia secondary to spinal cord injury are estimated, with a male:female ratio of 4:1. In the United States, traffic accidents have ranked first, with 38.5%, since 1990, followed by violent acts and sports (1).

Patients with spinal cord injury present neurogenic bowel characterized by decreased compliance in the colon, abnormal myoelectric activity with slowed colonic transit (mainly from the transverse colon) and abdominal distension. This situation is aggravated by the use of drugs commonly used in spinal cord injury, which affect intestinal function (anticholinergics, opioids, etc.). These patients are subject to possible intestinal complications, which in patients with chronic spinal cord injury constitute the third cause of hospital readmission (10%), behind urinary (40.5%) and skin (17%) complications (3).

Acute abdomen in patients with spinal cord injury is rare and difficult to detect. The clinical recognition of digestive problems is interfered by spinal cord injury, due to decreased sensitivity, visceral sensation, etc., these patients do not present usual clinical manifestations of abdominal pathology.

Approximately 10% of patients with spinal cord injury may die from acute abdominal problems and possible causes of life-threatening acute abdomen are hemorrhage, intestinal perforation, acute cholecystitis, pancreatitis, among others.

Case report

A 34-year-old male with a history of complete ASIA A spinal cord injury at the T5 level, secondary to a gunshot wound who was admitted to the emergency room on 04.03.23 presenting a quantified fever of 38°C, decreased consistency of bowel movements, without mucus nor blood. On physical examination, TA 107/71 mmHg, HR 11 bpm, RR 26 rpm, Sat 90%, Temp 36°, Glu 107 mg/dl, generalized paleness of integuments is observed, cardiopulmonary without compromise, semi globose abdomen, at the expense of the adipose panniculus, decreased peristalsis, not painful on palpation, without megalia or muscular resistance. Genitals according to age and sex, presence of urinary catheter with cloudy urine. EGO Turbid, proteins +, ph 5, Blood +++, WBC 500, WBC x field 10-15, moderate epithelial cells, cylinders +. In the sacral region, a grade II sacral ulcer was observed, with scant bleeding on mobilization, with no outlet for fetid material and irregular fibrin

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Figure 1. Plain abdominal X-ray in recumbent position, visualizing small bowel loop distension, in upper quadrants with poor air distribution, ileocecal valve dilation and abundant coprostasis.

edges. WBC 7.4, NEUT 90.2%, Hb 11.6, Hct 35.2, Plt 314, Cr 3, BUN 46.6, PCR 48.6.

The patient was admitted to the Internal Medicine service on 04.04.23 with a diagnosis of sepsis of abdominal origin secondary to acute gastroenteritis due to the isolation of enterotoxigenic and enteroaggregative E.Coli (negative for Clostridium Difficile) and KDIGO III acute kidney injury. On 04.09.2023, a computerized axial tomography of the abdomen and pelvis was performed, observing interloop edema, with abundant distal fecal matter. (Figure 2 A,B) Leu 20.3, Neu 92.9%, Hb 9.4, Hct 29.8, Plt 333, Cr 3.4, BUN 84.7, PCR 26.4. He was evaluated by the General Surgery service, and since no data compatible with acute surgical abdomen was found in the physical examination, the same diagnosis was continued in the Internal Medicine service. On 04.13.2023, he entered the intensive care service, with the following laboratories: WBC 14.4, NEUT 91.1%, Hb 11.2, Hct 35.4, Plt 157, Cr 1.6, BUN 50, PCR 12.7, where after two days of stay he requests reassessment from the General Surgery service, with a simple tomography report, which documents the presence of free air in the cavity.

Diagnostic laparoscopy and subsequent conversion to exploratory laparotomy were performed when 500 cc of purulent and fetid fluid were found, as well as exposure of 60% of the mucosa of the sigmoid colon. Cavity washing and drying were performed

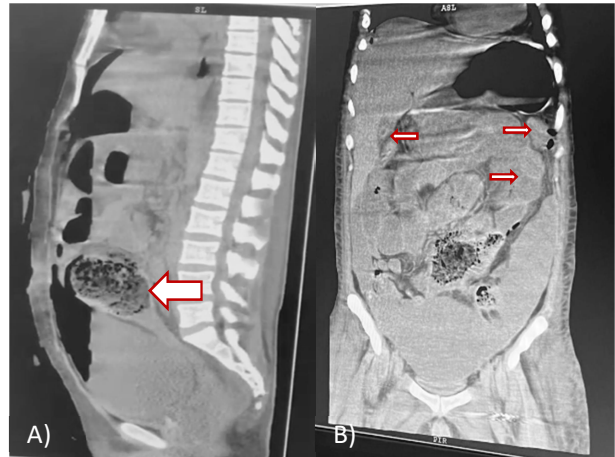


Figure 2. A) Computed tomography of sagittal section which shows dilation of the ileocecal valve with abundant coprostasis (arrow), air-fluid levels and free air in the abdominal cavity. B) Coronal cut computed tomography showing free air in the abdominal cavity (arrows) and coprostasis at the level of the ileocecal valve.

with adhesion release, sigmoid closure in two planes, Brooke-type terminal ileostomy 60 cm from the ileocecal valve, colon closure in Hartmann's pouch and prevascular pouch placement.

The patient died one day after surgery due to persistent hemodynamic instability, metabolic acidosis refractory to treatment, refractory septic shock secondary to perforation of the hollow viscera.

Discussion

Lumbosacral trauma interrupts parasympathetic outflow to the intestine, immobilizing the descending colon and rectosigmoid colon and making them excessively flexible, leading to the development of megacolon and rectum shortly after injury (2). Patients with spinal cord injury present neurogenic bowel characterized by decreased compliance in the colon, abnormal myoelectric activity with slowed colonic transit (mainly from the transverse colon) and abdominal distension.

This situation is aggravated by the use of drugs commonly used in spinal cord injury, which affect intestinal function (anticholinergics, opioids, etc.). These patients are subject to possible intestinal complications, which in patients with chronic spinal cord injury constitute the third cause of hospital readmission (10%), behind urinary (40.5%) and skin (17%) complications (3). The clinical recognition of digestive problems is interfered by spinal cord injury, since due to decreased sensitivity, visceral sensation, etc., these patients often do not present the usual clinical manifestations of abdominal pathology. Ileus is a non-specific clinical manifestation of abdominal pathology, which requires a broad differential diagnosis (urological, digestive causes, etc.).

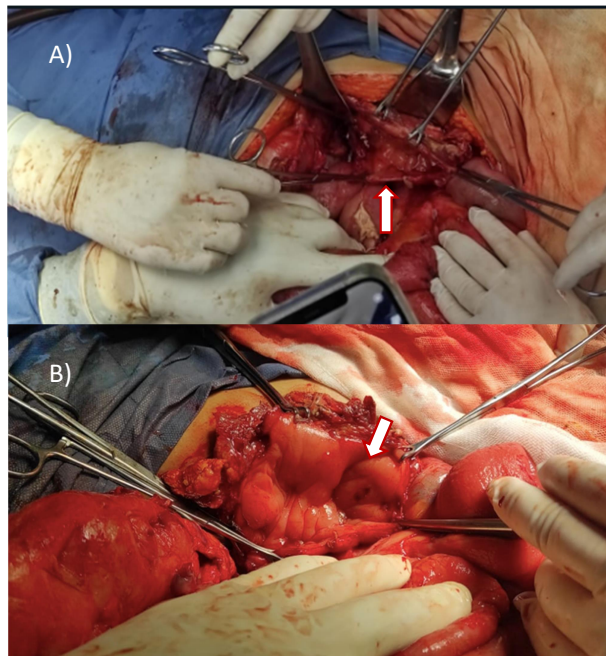


FIGURE 3. A) Trans-surgical photo showing perforation and exposure of approximately 60% of the sigmoid colon mucosa (arrow). B) Trans-surgical photo which shows perforation and mucosa of the sigmoid colon (arrow).

Mechanical obstruction and megacolon secondary to *Clostridium difficile* infection should be ruled out and early signs of ischemia or perforation should be sought, the two main complications of this syndrome. In the imaging tests, the right colon and the cecum show the most significant distension, and levels of air and dilation may appear in the small intestine. Early diagnosis and proper management are essential to minimize morbidity and mortality. It seems that the risk of perforation and/or ischemia increases rapidly with cecal diameters greater than 10-12 cm³ and when the duration of distension exceeds 6 days. In the Neumayeret study, leukocytosis was documented in only 55% of cases. When a spinal cord injury patient presents with an acute abdomen, the lack of classic symptoms and signs can hinder the clinician's ability to make a correct diagnosis. Laboratory results are not reliable in the diagnosis of acute abdomen in patients with Spinal Cord Injury. Most of these patients have urinary tract infections at some point and many do not produce leukocytosis (9). Even if leukocytosis is present, it could be attributed to concurrent conditions such as pressure ulcers or respiratory disease, which also occur frequently. This is especially true in situations where the physician does not typically treat these patients (4). In the past, late diagnosis has been documented to lead to a 10-15% mortality rate among patients with spinal cord injuries (7). We consider it important to perform a simple abdominal X-ray before any ileus that occurs after the acute phase of spinal cord injury, to make a good differential diagnosis, taking into account this syndrome (3). The approach to

intestinal treatment in patients with Spinal injury must address specific issues such as fecal incontinence, constipation, and functional mobility. This must be within the context of the patient as a whole person and consider her cultural, social, sexual and vocational roles. It is necessary to develop a bowel care regimen that fits into the person's long-term routine. The goal should be effective colonic evacuation without fecal incontinence or other complications (5). Colostomy may be an alternative for patients with Spinal Cord Injury with ongoing difficulties with bowel management. It has been shown to result in a better quality of life, is accessible to those with poor manual dexterity, and offers control of fecal incontinence (6). Recent studies on how patients with spinal cord injury and neurogenic bowel perceive improvements in their quality of life by undergoing this surgery have been very positive. Patients with colostomy report a decrease in the weekly times required for bowel care, improvements in quality of life, and, in most cases, they wish that they had been offered the colostomy option some time earlier. With these studies we can conclude that colostomy should not be left as an option for when nothing else has worked, but rather when the patient really feels that it could improve her life. And it is generally accepted that laparoscopic colostomy is a quick, simple, and safe procedure and should be the method of choice for most patients requiring a colostomy.

Conclusion

Complications associated with spinal cord injury are often underdiagnosed pathologies and most of the time require support from diagnostic aids such as imaging studies. In turn, it is necessary to have a high diagnostic suspicion when the evolution of a patient does not show improvement after adequate drug treatment. Differential diagnoses should never be ruled out since the clinical picture is usually non-specific. Lastly, it is essential that training in the interpretation of imaging studies is always provided within professional medical training, since not having radiologists does not exempt us from the responsibility of detecting signs inherent to a complication. Before any patient with high spinal cord injury, we must carry out a multidisciplinary follow-up with more than one specialty from the first time. They are evaluated both in the emergency room and in the outpatient clinic, and anticipate preventing possible complications, both urinary, integumentary and gastrointestinal disorders, always opting for the treatment that best suits each specific case of patient and injury.

Conflicts of interest

The authors declare no conflict of interest.

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References

1. Acevedo J.C Varon L Berbeo M Feo O Díaz R. Avances fisiopatológicos para el entendimiento de la lesión medular traumática. *Revista Colombiana de Ortopedia y Traumatología (SCCOT)*, 2008; volumen 22(4): 272-281.
2. Harari D, Minaker KL. Megacolon in patients with chronic spinal cord injury. *Spinal Cord*. 2000 Jun;38(6):331-9. doi: 10.1038/sj.sc.3101010.
3. Seoane-Rodríguez, S., Ferreiro-Velasco, M. E., Luengo-González, P., La Barrera, S. S., Montoto-Marqués, A., & Rodríguez-Sotillo, A. (2007). Síndrome de Ogilvie y lesión medular. A propósito de un caso. *Rehabilitación*, 41(4), 185-188. Available from: [http://dx.doi.org/10.1016/s0048-7120\(07\)75514-7](http://dx.doi.org/10.1016/s0048-7120(07)75514-7).
4. Sarifakoğlu, B., Afşar, S., Yalbuздаğ, Ş. et al. Acute abdominal emergencies and spinal cord injury; our experiences: a retrospective clinical study. *Spinal Cord* 52, 697–700 (2014). Available from: <http://dx.doi.org/10.1038/sc.2014.106>.
5. Lynch AC, Anthony A, Dobbs BR, Frizelle FA. Bowel dysfunction following spinal cord injury. *Spinal Cord*. 2001;39:193-203.
6. Qi Z, Middleton JW, Malcolm A. Bowel Dysfunction in Spinal Cord Injury. *Curr Gastroenterol Rep*. 2018 Aug 29;20(10):47. doi: 10.1007/s11894-018-0655-4. PMID: 30159690.
7. Miller, B.J., Geraghty, T.J., Wong, C.-H., Hall, D.F. and Cohen, J.R. (2001), Outcome of the acute abdomen in patients with previous spinal cord injury. *ANZ Journal of Surgery*, 71: 407-411. Available from: <http://dx.doi.org/10.1046/j.1440-1622.2001.02146.x>
8. Chaves, A., Liang, H. H., & Valverde, J. L. (2015). TEMA 15-2015: Beneficios de la colostomía en la calidad de vida del paciente con lesión medular crónica y ventajas de su realización por vía laparoscópica. *Revista Clínica de la Escuela de Medicina UCR-HSJD*. Available from: http://dx.doi.org/10.15517/rc_ucr-hsjd.v5i5.21709.
9. Neumayer LA, Bull DA, Mohr JD, Putnam CW. The acutely affected abdomen in paraplegic spinal cord injury patients. *Ann Surg [Internet]*. 1990;212(5):561–6. Available from: <http://dx.doi.org/10.1097/00000658-199011000-00002>.

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