

CASE REPORT

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# Surgical intervention for the correction of fecal impaction in an obstipated cat with an old compression injury in the lumbosacral region of the spine

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## Abstract

**Background** Feline obstipation is a clinical condition often manifested by defecation inability that results in fecal impaction. This is frequently associated with a blunt traumatic injury that affects mostly the spine and surrounding structures in the caudal part of the back leading to vertebral compression.

**Case presentation** A 6-month-old, female, mixed-breed cat of 1.49-kg BW was presented with a history of prolonged constipation (i.e., obstipation) along with discomfort and weakness. Prior to the presentation, the cat was medically treated with dietary fibers, fecal softeners, and enemas, but obstipation persisted. Clinical examinations revealed that there was straining but not effective for defecation. In addition, the cat had poor appetite and dehydration, electrolyte abnormalities, and defects in posture and gait. The lumbosacral region showed a depression that was supposed to be the consequence of an old, untreated regional injury. Radiographic imaging indicated a marked ventral curvature in the lumbosacral spine including major deviations in the positions of the L6 and L7 vertebrae and the sacrum as well. A firm tubular structure was felt on ventral abdominal palpation, and further ultrasonography revealed the tubular impaction. Laparotomy exposed a definite large bowel impaction, and enterotomy was performed to evacuate the firm feces. Postoperatively, supportive medications and care were provided for better recovery. However, the impaction recurred within 3 months after surgery, and euthanasia was a further choice.

**Conclusions** Traumatic injuries involving the lumbosacral spine in cats might be serious enough to lead to severe constipation and thereby bowel impaction. Therefore, treatment should be prompt and accurate in any case of spinal injury to avoid further complications.

**Keywords** Long-term constipation, Curved lumbosacral spine, Bowel obstruction, Enterotomy, Case report

## Background

Constipation is a relatively common intestinal dysfunction in cats, which is often characterized by infrequent or difficult defecation, or absence of defecation that results

in the accumulation of feces in the middle to terminal portions of the large intestine, i.e., colon and rectum (Yam 1997; Baral 2012). Prolonged and severe constipation (i.e., obstipation) can lead to megacolon and permanent bowel obstruction unless accurate treatment is given. Obstipation results in fecal impaction due to loss of bowel motility, especially colonic motility. Cats of any age, sex, and breed can be affected by this trouble. However, the middle-aged, male cats of domestic shorthair/longhair, Siamese, and Manx breeds are reportedly found to have obstipation (Washabau and Hasler 1997).

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The historically reported causes for this bowel disorder include a low-fiber diet, hair ingestion from grooming, a dirty litter box for defecation (leading to psychological changes), anal sacculitis, perineal abscess, colonic and rectal obstruction by tumors, scars or strictures, fat deposition in the pelvic region, pelvic and spinal fractures, neurological disorders and inertia of intestinal smooth muscles, narrowed pelvic outlet from malunion fractures, metabolic imbalances, electrolyte abnormalities, and certain drugs that can modify intestinal motility (Jergens and Litster 2006; White 2014).

The common clinical signs are abdominal discomfort, tenesmus, defecation failure or reduced/painful defecation for several days to weeks, dry and hard feces (small amount, occasionally stained with blood), decreased appetite, general weakness, dehydration, and weight loss (Sherding 2006). Diagnosis can be made based on physical examination emphasizing the abdominal palpation to evaluate the intensity and extent of dilated and impacted bowel segments. A digital rectal examination is also practiced to confirm whether the obstruction is from fecal impaction, distal colonic or rectal intraluminal mass or stricture, or from the narrowing of the pelvic canal (Van and Jergens 2019). Neurological examinations can be performed to assess the function and integrity of the sacrocaudal spinal cord in this regard (Jergens and Litster 2006). In addition, radiography can be helpful to diagnose fractures, lesions, or any abnormalities in the adjacent spine and skeleton, associated with these defects.

Most medical treatments include the use of laxatives (lactulose or docusate sodium), emollients, and enemas followed by digital manipulation to evacuate feces and prokinetic agents (Moore and Morgan 2008; Baral 2012). Surgery is considered after the failure of medical management. Subtotal colectomy and pelvic canal widening are practiced for the management of obstipation and megacolon in cats (Angelou et al. 2020; Cinti et al. 2020). Usually, the surgeries involve conventional and major invasive procedures. In contrast, precision surgeries (without considerable resection) for the management of obstipation in cats are not frequently reported.

This study describes a typical case of fecal impaction in an obstipated cat that had a previous injury in the lumbosacral region. The diagnosis of the case and thereafter its management by enterotomy (a less critical and invasive surgery) are also reported here along with the outcome.

## Case presentation

### Case history and clinical findings

A female (entire), domestic, mixed-breed cat of 6 months old and 1.49-kg body weight (BW) was referred to the Veterinary Teaching Hospital (VTH)



**Fig. 1** The cat with abnormal posture and gait and a depression (arrow) in the lumbosacral region

**Table 1** Hematobiochemical indices of the cat at the outset

Blood parameters	Estimated values	Reference intervals
Glc (mg/dL)	91.6	80–120
TEC ( $\times 10^6/\mu\text{L}$ )	10.4	6.0–10.1
Hct (%)	44.7	25–45
Hb (g/dL)	13.5	8.1–14.2
TSP (g/dL)	7.9	6.0–8.1
BUN (mg/dL)	33.1	10–35
Cr (mg/dL)	1.4	0.6–2.0
Na (mmol/L)	137.2	145–160
K (mmol/L)	3.8	4.0–5.8
Cl (mmol/L)	99.4	109–128

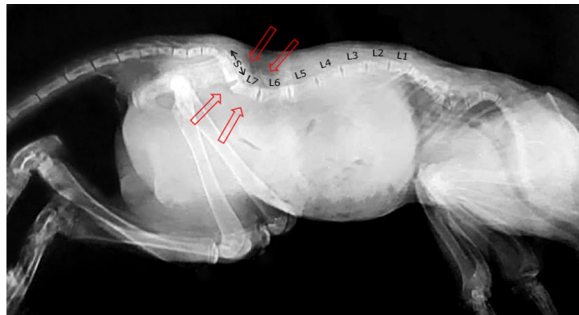
Glc glucose, TEC total erythrocyte count, Hct hematocrit, Hb hemoglobin, TSP total serum protein, BUN blood urea nitrogen, Cr creatinine, Na sodium, K potassium, Cl chloride

of Bangladesh Agricultural University (BAU) with the complaint of straining to defecate for 17 days. Prior to being admitted to the hospital, the cat was frequently treated with dietary fibers (pumpkin), laxatives (lactulose), and soap-water enemas; however, the overall condition remained unchanged. There was no evidence of gastrointestinal foreign bodies and tumors, inflammatory bowel disease, pelvic outlet narrowing or obstruction, anorectal affections, and nervous disorders. During clinical examinations, periodic straining and discomfort were observed, but defecation was absent. In addition, decreased appetite, general weakness, and lethargy were noted. Based on the characteristics of the cat's skin turgor and mucous membrane, 6% dehydration was estimated. There were abnormalities in the stance and locomotion of the cat, and a considerable depression was found in the lumbosacral region of the backbone (Fig. 1). According to the owner, an earlier untreated traumatic injury could be the probable reason for this. Hematobiochemical examinations were done, and the findings (Table 1) revealed electrolyte abnormalities. Subsequently, intravenous (IV) fluid

therapy, i.e., 40 ml of 0.9% NaCl (normal saline) solution at 22 ml/kg/h, was given to check dehydration and balance electrolytes.

### Radiographic findings

The spinal radiography (Fig. 2) helped to detect a distinct ventral curvature (similar to scoliosis) in the lumbosacral region of the vertebral column. There were marked deviations in the positions of the sixth and seventh lumbar (L6 and L7) vertebrae and the fused sacrum. The L5 vertebra, bony pelvis, and caudal vertebrae of the tail base were somewhat depressed. Besides these, the X-ray film showed an abnormality (ventral spreading and dorsal narrowing) in the space between



**Fig. 2** Radiograph (lateral view) shows a marked ventral curvature in the lumbosacral spine (red arrows) involving mostly the L6, L7, and sacrum of the cat. Mild depressions are in the levels of L5, pelvis, and caudal vertebrae (1–4). L1–L7: all seven lumbar vertebrae, S: the fused sacrum

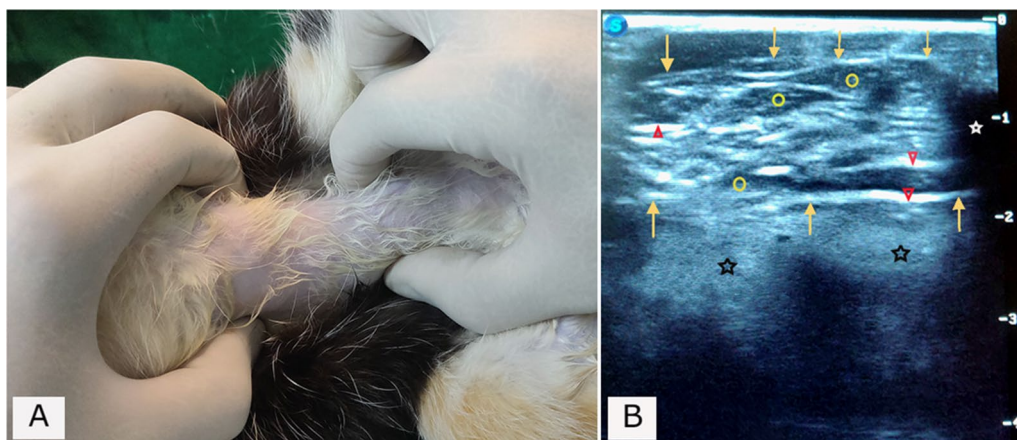
the L7 vertebra and the sacrum, which indicated an intervertebral disc defect.

### Physical examination and ultrasonography

Deep palpation over the ventral abdominal field revealed a firm, dilated tubular structure that was almost parallel to the ventral midline (Fig. 3A). An ultrasound machine (SonoScape P15, Shenzhen, Guangdong, China) was used to aid the diagnosis by placing a superficial transducer probe (linear) over the ventral abdomen. In the longitudinal orientation, the sonographic segment (i.e., the tubular structure) was found to have highly echogenic surfaces with several hyperechoic flakes (gases) and hypoechoic zones (resembling bowel contents) (Fig. 3B). These were suggestive of thickened and obstructed bowel and further aided in a presumptive diagnosis of fecal impaction.

### Enterotomy and correction of fecal impaction

With the informed consent of the owner, surgical treatment was considered for the affected cat to remove the impaction. Before surgery, the cat was kept off feed and water for 8 h. Then, it was stabilized with IV 35 ml of 5% dextrose in normal saline. Prior to enterotomy, the animal was premedicated with atropine sulfate at the rate of 0.04 mg/kg BW (Atrovet<sup>®</sup>, Techno Drugs Ltd., Narsingdi, Bangladesh) followed by sedation with xylazine hydrochloride (HCl) at the rate of 1.1 mg/kg BW (Xylaxin<sup>®</sup>, Indian Immunologicals Ltd., Hyderabad, India) via intramuscular (IM) injections. After 8 min, ketamine HCl at the rate of 15 mg/kg BW (Ketalar<sup>™</sup>, Popular Pharmaceuticals Ltd., Dhaka, Bangladesh) was used as an IM injection for the induction of general anesthesia. The surgical field over the ventral abdominopelvic region was



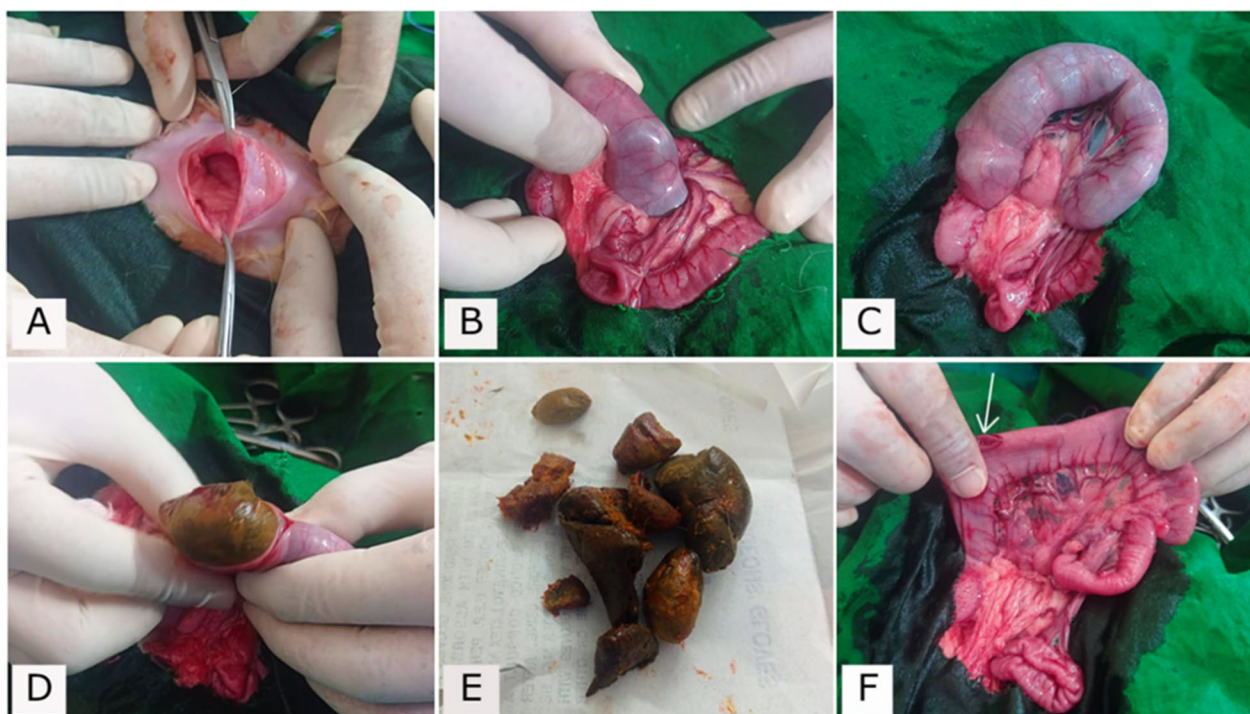
**Fig. 3** Abdominal palpation and ultrasonography of the cat. **A** Detection of a firm, tubular structure by fingers over the skin. **B** Ultrasonography reveals highly echogenic surfaces (yellow arrows) of the structure, hyperechoic flakes due to gases (red arrowheads), hypoechoic areas (yellow circles) indicating bowel contents (semisolid/fluid), acoustic shadows (black stars), and anechoic zone (white star). Linear probe; orientation: longitudinal, frequency: 7.5 MHz, depth: 4 cm

aseptically prepared. In the anesthetized and dorsally recumbent cat, a ventral midline incision of 1.8 inches in length was made just between the umbilicus and pubic symphysis. Exploratory laparotomy revealed a dilated and impacted bowel segment, i.e., colon (Fig. 4A, B, and C). Enterotomy was performed along the longitudinal axis of the most dilated portion of the colon, which involved a linear incision (about 1.5 inches) in the antimesenteric border of the portion. Then, the impacted fecal materials were manually removed (Fig. 4D and E). The patency (organ vitality and supplying vessels) of the empty bowel segment was visually checked (Fig. 4F), and normal saline was frequently sprayed to prevent drying out. Next, the colon incision was approximated (Fig. 5A, B, and C) with extramucosal interrupted sutures, using polydioxanone of size 3–0 (UNISYNTH PDS, Universal Surgicals, Bangalore, India), and thereafter the bowel segment was returned to the cavity. During the entire suturing, intestinal forceps were kept inserted into the lumen of the bowel segment, which got removed carefully just before the final closure of the segment. The forceps helped as a guide in better apposition and also to avoid the retraction of the intestine. After peritoneal lavage, the abdomen was closed routinely, which involved layer-by-layer muscle closures (Fig. 5D and E) with simple interrupted sutures of polyglactin 910 of size 1–0 (Vicryl™, Ethicon,

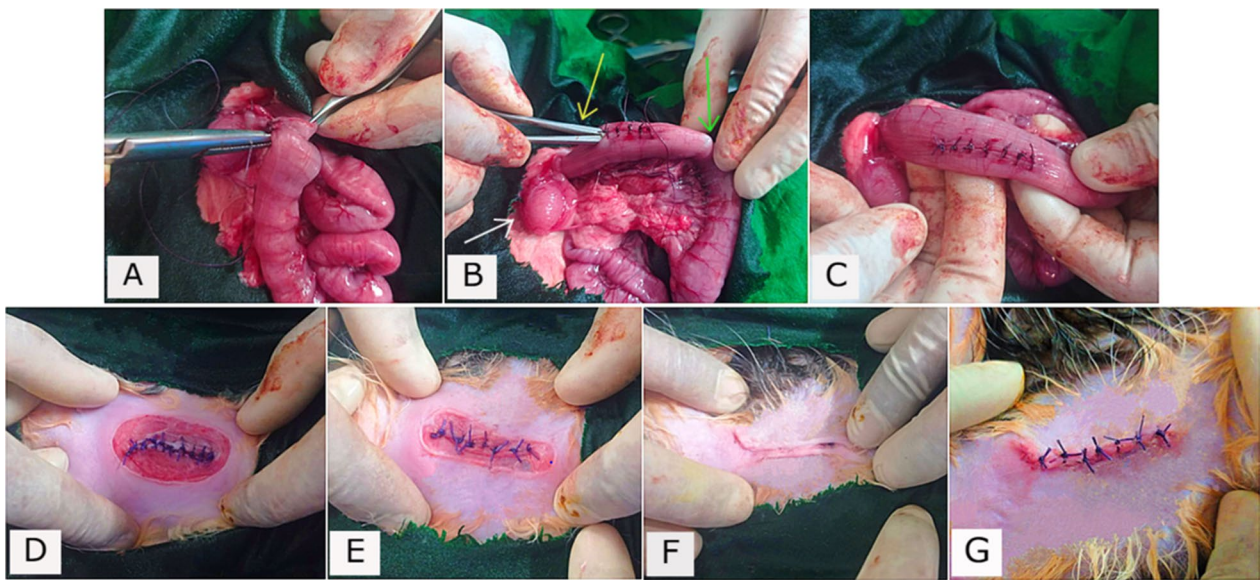
J & J Medical Devices Companies, USA). Finally, the skin edges were sewn together by subcuticular suture (Fig. 5F) using Vicryl™ of size 2–0. Additionally, to provide support, a layer of simple interrupted sutures (Fig. 5G) of Vicryl™ (2–0) was placed over the subcuticular suture.

#### Postoperative care and follow-up

In the postoperative unit, the cat was resuscitated with 45 ml of IV 5% dextrose in normal saline, and the same fluid therapy was considered at every 12-h interval for the next 2 days. Mild but frequent seizures and hunger were noted at the recovery of sensation, and immediately 20 ml of oral rehydration saline and thereafter 15 mg of oral phenobarbitone sodium (Barbit® 30, Incepta Pharmaceutical Ltd., Dhaka, Bangladesh) were provided. Furthermore, the same dose of phenobarbitone was maintained at every 12-h interval for 7 days followed by 8 mg of phenobarbitone twice daily for another 2 weeks. The other routine medications included ceftriaxone sodium at the rate of 28 mg/kg BW (Triject®, Eskayef Pharmaceutical Ltd., Dhaka, Bangladesh) for 12 days, ketoprofen at the rate of 2.2 mg/kg BW (Ketovet, Techno Drugs Ltd., Narsingdi, Bangladesh) for 5 days, and pheniramine maleate at the rate of 1 mg/kg BW (Antihista-Vet®, Square Pharmaceuticals Ltd., Dhaka, Bangladesh) for 7 days. In addition, a liquid feed was recommended



**Fig. 4** Laparotomy, enterotomy, and removal of impacted feces. **A** A laparotomic incision for abdominal exposure. **B** Identification of the firm and dilated bowel segment. **C** Complete exteriorization of the impacted colon. **D** Pressing impacted feces out of the colon following colotomy. **E** Removed fecal contents. **F** Empty bowel segment showing the vitality of the part along the segment and around the colon incision (white arrow)



**Fig. 5** Routine closure of the abdomen and approximation of the skin edges. **A** Suturing the colon. **B** Placing intestinal forceps (yellow arrow) into the lumen to guide (green arrow) and aid in suturing. Observing adjacent structures and urinary bladder (white arrow). **C** Closure of the colon by interrupted extramucosal sutures. **D** Closure of the abdomen (first layer). **E** Second layer closure of the abdomen. **F** Initial skin closure by subcuticular suture. **G** Final skin closure by simple interrupted sutures

after 20-h of surgery, and a fiber-rich diet along with 1.5 g oral lactulose (Inolac<sup>®</sup> Oral Solution, Incepta Pharmaceutical Ltd., Dhaka, Bangladesh) was suggested from 72-h postoperatively and maintained twice daily for 10 days. Topical antiseptics were used to prevent surgical site contamination. After 14 days of surgery, the external sutures were removed, and the cat was apparently healthy except for the prior abnormalities in posture and gait due to the ventrally arched spine in the lumbosacral region. However, on the 81st day following surgery, the owner again reported the cat with severe constipation refractory to medical management and requested euthanasia rather than a second surgery, i.e., subtotal colectomy recommended by vet surgeons.

## Discussion

Constipation is a sequel of pelvic canal narrowing secondary to traumas and pelvic fractures in cats (Park et al. 2021; Pinna et al. 2021). Cats can easily get injured in the spine and pelvis by falling from a height or suddenly being struck in the caudal part of the back. Any fractured bone or part automatically may undergo healing with a malunion and thereafter becomes bent, twisted, or shorter in length if accurate surgical fixation and immobilization are not ensured. Severe pelvic canal narrowing can lead to chronic intractable constipation and further megacolon in cats (DeGroot et al. 2016). In addition, traumatic or atraumatic spinal abnormalities such as lumbosacral intervertebral disc diseases may also cause

constipation alongside pelvic-limb paresis and urinary incontinence (Knipe et al. 2001; Harris and Dhupa 2008; Thanaboonipat et al. 2021). In this study, a female cat of 6 months old was found with prolonged constipation (i.e., obstipation) and a notable depression in the lumbosacral region. Earlier studies showed a strong association between constipation and pelvic injury/defects in cats; however, reports on obstipation from traumatic lumbosacral vertebral abnormalities are limited in this context. And, as far as we know, obstipation in comparatively younger female cats is rarely documented.

The considerable depression in the caudal part of the cat's back was presumed as the consequence of an old traumatic injury (blunt) that had been neglected and left untreated. The owner stated that only periodic rest had been ensured for the injured cat. Hence, the compressive force of the injury and its later impacts upon auto-healing might have caused luxation (i.e., deviations in the positions) of associated vertebrae, cartilages, tissues, muscles, and nerves over the affected area and ultimately led the lumbosacral region to get ventrally curved. While the argument rests on the progression of this clinical condition to defecation insufficiency, we believe that failures in the earlier diagnosis and treatment may be the predominant contributors to this post-traumatic defect in the lumbosacral region, and following injury, the cat might have not defecated well over a period to avoid pain and thereby developed a habit of incomplete defecation, possibly leading to constipation.

Conservative treatment is not superior to surgical management in this regard (Grierson 2019). Radiography usually aids in the diagnosis by ruling out other related issues (Bouabdallah et al. 2020; Fugazzotto et al. 2022). In this case, the radiograph did not show any malunion in the regional spine; however, there was an intervertebral disc defect between the L7 vertebra and the sacrum, which is correlated with those in a different study (daCosta et al. 2020). Apart from traditional radiography, myelography, computed tomography scanning, and magnetic resonance imaging could have been performed to better evaluate the status of the spinal cord and any mineralization in the discs, as found in other research (Knipe et al. 2001; Hamilton-Bennett and Behr 2019; Carrera et al. 2022). However, these were unavailable during the case study.

Hematobiochemical findings of the cat indicated electrolyte abnormalities as lower levels of Na, K, and Cl were recorded in the tests. The low serum electrolytes might be the reason for neuromuscular weakness leading to general weakness and lethargy in the cat. That is why, an initial parenteral infusion of normal saline was considered, and during the immediate postoperative period, 5% dextrose in normal saline was provided to the cat to balance energy and prevent hypovolemia and hypoglycemia.

In this case, abdominal palpation provided a clue to retained feces in the intestine in a tubular fashion, and further ultrasonography confirmed the fact and highly indicated the possibility of fecal impaction and large bowel obstruction. The practice of ultrasonography to detect this defect is consistent with other studies (Griffin 2019; Madany et al. 2020).

The laparotomy exposed a thickened colon impacted with feces, and an enterotomy (i.e., colotomy) was done to free the blockage by evacuating feces, which is in agreement with other reports (Saha et al. 2016; Telila et al. 2022). The premedication, sedation, induction of anesthesia, and suturing technique were relevant to those in other studies (Ganesh et al. 2018; Munif et al. 2022). Only a small colotomy was considered here, although subtotal colectomy is the frequently found surgery in related cases of bowel dysfunction such as megacolon (Barnes 2012; Angelou et al. 2020). This case was differentiated from megacolon by visual inspection of the intact colonic diameter after laparotomy and also considering on-spot colonic structures (inner and outer luminal walls, vessels' potency, etc.) and their vitality for peristalsis after colotomy and removal of feces. In this context, we would prefer to state that if the cat remained untreated for a few more days, a megacolon would occur. Although, in this case, subtotal colectomy would have been performed instead of colotomy, it was not done to avoid greater operative stress and postoperative risks and complications reported earlier (Grossman et al. 2021).

In the postoperative episodes, supportive medications and care were provided to prevent secondary infections and promote healing. The occurrence of postoperative epilepsy (i.e., repeated events of seizures) might be due to the overall stress from the anesthesia and surgical procedure that provoked hypovolemia, hypoxia, and metabolic alterations related to cerebral glucose metabolism, consistent with other research (Barnes 2018). Hence, neuromuscular incoordination, mild convulsion, and drowsiness were noted in the cat. The use of an anticonvulsant drug (e.g., phenobarbitone) was effective in the treatment of seizures, which is correlated with other studies (Finnerty et al. 2014; Barnes 2018; Hasegawa et al. 2022).

In this case, simultaneous spinal surgery was not considered to avoid the risks of death and the possibility of greater complications, and the more severe condition (i.e., bowel impaction) was solely prioritized. An immediate post-traumatic diagnosis and spinal surgery (if needed) could have been useful for this case. In this regard, it is worth mentioning that disc-associated lumbosacral diseases, involving intervertebral disc extrusion/herniation and mineralization, can be treated by spinal decompressive surgeries, i.e., dorsal laminectomy (followed by dorsal annulectomy and nuclear extirpation), hemilaminectomy (followed by removal of degenerative disc materials), and lumbosacral stabilization (Knipe et al. 2001; Danielski et al. 2013). The success of these protocols greatly depends on the physical status of the animals regarding overall health and stamina, alongside the prompt reporting for treatment of acute (early stage) cases of spinal injuries. On the contrary, surgery could be more challenging for an old spinal injury and may lead to several complications, i.e., spinal instability, dural tears, recurrent disc herniation, junctional kyphosis, pseudarthrosis (non-union), and neurological defects (Papadakis et al. 2013). In this case, decompressive surgery was thought to be ineffective as it was an already luxated and adapted regional spine, and the cat was very weak along with the obstipation.

A recurrence of constipation was observed within 3 months of surgery. The actual reason for this remained unknown as the owner did not show further interest in a thorough diagnosis. The possible differential diagnoses might include megacolon, localized scar and stricture secondary to colotomy, progressive myelopathy from degenerative spinal conditions, etc. Although a second surgical option (i.e., subtotal colectomy) was suggested, the owner preferred euthanasia for the cat considering the long-term prognosis (recovery versus complications) and treatment costs.

## Conclusions

Traumatic spinal injury involving the lumbosacral region may be a potential factor for the occurrence of constipation and subsequent fecal impaction in cats. Immediate diagnosis-based treatment should be considered for any spinal affections. Delay in reporting such cases can lead to long-term troubles causing intestinal dysfunction, and thereafter symptomatic treatments including surgery may not be effective.

## Abbreviations

BAU	Bangladesh Agricultural University
BUN	Blood urea nitrogen
BW	Body weight
Cl	Chloride
Cr	Creatinine
Glc	Glucose
Hb	Hemoglobin
HCl	Hydrochloride
Hct	Hematocrit
Hr.	Hour
IM	Intramuscular
IV	Intravenous
L5/L6/L7	Lumbar five/lumbar six/lumbar seven
Ltd.	Limited
MHz	Megahertz
Na	Sodium
NaCl	Sodium chloride
TEC	Total erythrocyte count
TSP	Total serum protein
K	Potassium
VTH	Veterinary Teaching Hospital

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## Author contributions

MRM performed the clinical examinations and diagnosis, anesthetic and surgical procedures, prescription writing, manuscript writing, and finalization. MSS and AH assisted during the surgery and postoperative follow-up and contributed to the literature review. All authors read and approved the final manuscript.

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## Availability of data and materials

All the data and supporting files have been presented within the case report.

## Declarations

### Ethics approval and consent to participate

This work was approved by the authority of the VTH of BAU, and consent for participation was taken.

### Consent for publication

Informed consent for publication was obtained from the animal owner.

### Competing interests

The authors declare that they have no competing interests.

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