

Laparoscopy in Pediatric Abdominal Trauma

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ABSTRACT

Background: The use and indications for laparoscopy have been increasing. As part of this trend, a new algorithm may emerge for pediatric trauma in which laparoscopic techniques are used in hemodynamically stable patients with suspected hollow viscus perforation.

Case Report: We present a case in which laparoscopy was successfully used in a pediatric trauma patient as a diagnostic and therapeutic modality. A 4-year-old boy was a back-seat passenger in a head-on collision motor vehicle accident. He was restrained by a lap seat belt. He sustained a concussion, a large forehead laceration and a seat belt abdominal injury. On admission, he complained of abdominal pain. Physical examination revealed a soft, non-distended abdomen with moderate diffuse tenderness. He was hemodynamically stable. Computerized tomography of the abdomen revealed free fluid in the pelvis. No abnormalities were detected in the liver or spleen. Because of clinical deterioration and suspected intestinal perforation, diagnostic laparoscopy was utilized instead of proceeding directly to celiotomy. At laparoscopy a jejunal perforation was found and successfully repaired laparoscopically. Large hematomas were seen in the mesentery, as well as an unsuspected splenic laceration. No active bleeding was found. The patient recovered uneventfully and was discharged 5 days following the surgical procedure.

Conclusion: This case illustrates the efficacy of using early laparoscopy in children with abdominal trauma when diagnosis is difficult and hollow viscus injury is suspected.

Key Words: Abdomen, Child, Laparoscopy, Trauma.

INTRODUCTION

Seat belts have decreased the number of deaths in the general population.¹ However, there has been an increase in small bowel injury due to lap seat belts causing blunt trauma.² Small bowel injury and especially jejunal injury can be difficult to diagnose.^{3,4} The use of diagnostic peritoneal lavage and celiotomy for trauma is more commonly used in adults than in children. Delay in diagnosis may result in increased morbidity and mortality.^{5,6} With the increasing use of computerized tomography (CT) and ultrasound in trauma, the presence of free fluid in the abdomen needs to be carefully monitored.⁷ In this report, we present a case of intestinal perforation in a child caused by a seat belt injury which was managed successfully with laparoscopic surgery.

CASE REPORT

A 4-year-old boy was brought by a passerby to the emergency department of our institution. This boy had been involved in a head-on motor vehicle accident. He was in the back seat wearing a lap belt at the time of impact. He had been unconscious prior to arriving at the emergency department. On waking, he did not cry or move extensively. He complained of abdominal pain and headache. There was no significant past medical history, past surgical history, medications, or allergies. The patient was otherwise a healthy child.

Physical examination showed a large transverse laceration on the forehead approximately 7 cm in length. The abdomen was soft, not distended, and was tender diffusely but more on the right side than the left. There were abrasions consistent with seat belt marks on the abdomen. The patient had bowel sounds. Plain radiologic work-up did not reveal abnormalities in the cervical spine, chest or pelvis films. White blood cell count was 12.5 K with 30% segmented neutrophils. Amylase was normal (64 U/L). A nasogastric tube and Foley catheter had been inserted.

Because of the abdominal tenderness, a CT scan was done of the patient's abdomen and pelvis. With the history of loss of consciousness, a head CT scan was done as well. The CT scan of the head did not reveal abnormalities. There was free fluid in the pelvis. The density of the fluid was more like that of water than blood. No free air was

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detected. No abnormalities in the spleen, liver, pancreas, adrenals, and kidneys were detected. Cystogram showed an intact bladder. The day following the injury the patient was febrile and became tachycardic. He continued to have abdominal pain. Physical examination revealed a diffusely tender and distended abdomen. The white blood cell count increased to 24,300 per mm³. He was started on triple intravenous antibiotics.

Because of these findings, the patient was taken to the operating room for laparoscopic exploration. The plan was to begin laparoscopically and, if a problem were found that could not be repaired with minimally invasive surgery, a full celiotomy would be performed.

Operative Technique:

The procedure was performed using general endotracheal anesthesia. A Veress needle was placed below the umbilicus. Pneumoperitoneum to 10 mm Hg was achieved. A 5 mm laparoscope was inserted below the umbilicus. Two other ports were placed. One 5 mm port was placed in the right upper quadrant; the other port, a 5 mm changed to a 12 mm port, was in the left lower quadrant. In this manner, triangulation could occur most anywhere in the abdomen. The small bowel was run from the ileocecal valve to the ligament of Treitz. A jejunal perforation was found about 12 cm distal to the ligament of Treitz.

During the exploration, many mesenteric hematomas were found at the ileocecal area and jejunum. These were contained with no active bleeding. There was serosanguinous fluid in the pelvis. A small splenic tear was also found. No active bleeding was noted. The perforation area was found and an Endostitch (US Surgical Corporation) was placed transversely. Using this stitch as a stay suture,⁸ the endostapler was used transversely to close the perforation. The stitch was then used to remove the excess tissue.

The abdomen was then thoroughly irrigated with antibiotic solution, about 3 L of warmed saline. The ports were removed. The left lower quadrant and umbilical ports were closed with 1-0 Vicryl suture. Catgut sutures were used to close the subcutaneous tissue. Skin was closed in a subcuticular manner with 4-0 Vicryl suture. The patient was extubated and taken to the pediatric intensive care unit.

RESULTS

The day following the surgical procedure, the patient showed marked clinical improvement. He was afebrile and his vital signs were normal. Physical examination revealed

a soft abdomen that was not tender or distended. He was out of bed and feeling better. The white blood cell count was 12,900 per mm³. The peritoneal fluid did not show bacterial growth. The Foley catheter and nasogastric tube were removed on postoperative days 2 and 3, respectively.

The patient was transferred out of the monitored setting and to the pediatric ward. He was started on a liquid diet on day 3 and advanced to regular diet the next day. By this time, he was totally ambulatory and riding a tricycle around the pediatric ward. Antibiotics were stopped 5 days post-operatively.

The patient was then discharged home on postoperative day 5. On follow-up, he had no complaints. He was eating well, and had no problems with bowel movements and no abdominal pain.

DISCUSSION

In this pediatric trauma case, the history and findings were suggestive of bowel injury.⁹⁻¹¹ The definite diagnosis of bowel perforation, however, could not be established prior to diagnostic laparoscopy. Free peritoneal fluid detected by CT scan or abdominal ultrasound, as demonstrated in our patient, is not an indication for immediate exploratory celiotomy.^{12,13} However, the presence of this fluid warrants careful and meticulous clinical follow-up. In the present case, the CT scan of the abdomen failed to demonstrate the splenic injury, which was subsequently found by laparoscopy. The CT also missed the mesenteric hematoma, as there was no streakiness suggestive of other problems.¹⁴ Since a diagnosis of small bowel perforation is difficult to prove preoperatively,¹⁰ the patient underwent laparoscopy as a diagnostic modality. On exploration, the perforation was easily found and repaired laparoscopically. This injury represented the typical burst mechanism injury.¹⁵ The splenic laceration was not actively bleeding and the mesenteric hematomas were not expanding; thus, these injuries required no surgical treatment. The patient recovered quickly and uneventfully following laparoscopic exploration and intestinal repair.

CONCLUSION

In view of this success, we believe that laparoscopy may play an important role in the diagnosis and treatment of abdominal trauma in children, and perhaps it should be made part of an algorithm in the management of pediatric abdominal trauma. In our institution, we are currently capable of performing diagnostic laparoscopy in the emergency department instead of diagnostic peritoneal lavage

for relatively hemodynamically stable patients. Although more operative time may be needed for laparoscopy, the information gained from it is much greater than that obtained from other modalities. We advocate the use of early laparoscopy in children with abdominal trauma when diagnosis is difficult and hollow viscus injury is suspected.

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