Ogilvie’s syndrome after pediatric spinal deformity surgery: successful treatment with neostigmine

Case report

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Ogilvie’s syndrome is a rare and potentially fatal disease that can easily be mistaken for postoperative ileus. Also known as acute colonic pseudo-obstruction, early recognition and diagnosis of the syndrome allows for treatment prior to bowel perforation and requisite abdominal surgery. The authors report a case of Ogilvie’s syndrome following spinal deformity correction and tethered cord release in an adolescent who presented with acute abdominal distension, nausea, and vomiting on postoperative Day 0. The patient was initially diagnosed with adynamic ileus and treated conservatively with bowel rest, reduction in narcotic dosage, and a regimen of stool softeners, laxatives, and enemas. Despite this treatment, her clinical course failed to improve, and she demonstrated significant colonic distension radiographically. Intravenous neostigmine was administered as a bolus with a rapid and dramatic response. This case is the first reported instance of neostigmine use for Ogilvie’s syndrome treatment following a pediatric neurosurgical operation.

Key Words • Ogilvie’s syndrome • neostigmine • pediatric • adolescent spinal deformity • neurosurgery • spine

Ogilvie’s syndrome, or acute colonic pseudo-obstruction, is a rare condition characterized by decreased gastrointestinal motility and colonic dilation that, if untreated, can result in cecal perforation and death. In the postoperative period following adolescent scoliosis surgery, gastrointestinal complications are common; the differential diagnosis includes adynamic ileus, superior mesenteric artery syndrome, and pancreatitis. Paralytic ileus is more common and initially has similar clinical symptoms that can mask an underlying bowel emergency. In the case of Ogilvie’s syndrome, which can carry a mortality rate of 25%–60%, early recognition and appropriate treatment can prevent bowel ischemia and perforation. Common invasive treatments focus on decompression and include colonoscopy and laparotomy with tube cecostomy. We present a case occurring after scoliosis surgery in an adolescent in whom medical management with neostigmine was used as a safe and effective alternative to these invasive measures.

Case Report

History and Examination. A 15-year-old girl presented with 1 year of worsening back pain and progressive scoliosis. On physical examination she was noted to have an elevated left shoulder and scapula and a right rib prominence. She was neurologically intact with no bowel or bladder symptoms. Further workup demonstrated the presence of a tethered cord with a filum lipoma that was believed to be a factor potentially contributing to her back pain and the development of her scoliosis. The scoliosis was classified as a progressive main thoracic curve of 43° and a thoracolumbar curve of 24°, Lenke Class 1AN.

Operation. The patient underwent an L-5 laminectomy and tethered cord release combined with selective thoracic fusion from T-4 to L-1 using segmental pedicle screw and rod instrumentation and autograft obtained from the same incision. Surgery was uneventful; electrophysiological monitoring of somatosensory and motor evoked potentials remained stable throughout the procedure. Total operative time was approximately 6 hours.

Postoperative Course. The patient was intact on postoperative neurological examination. That evening, approximately 4 hours after surgery was completed, the patient developed worsening abdominal pain and nausea. Examination at this time revealed a distended abdomen with diminished bowel sounds. The immediately postoperative spine radiographs and subsequent abdominal films
demonstrated marked colonic dilation and a gaseous pattern (Fig. 1).

Postoperative paralytic ileus was initially diagnosed, and treatment included bowel rest; a combination of stool softeners, laxatives, and enemas; and limitation of narcotic dosage. While the patient remained clinically stable, disease progression was noted radiographically (Fig. 2). On postoperative Day 6, her symptoms of abdominal distension and nausea progressively worsened, and plain abdominal radiographs demonstrated an increase in colon diameter from 11 to 15 cm (Fig. 3). A nasogastric tube was placed, and a pediatric surgery consultation was obtained. The patient was transferred to the pediatric intensive care unit for treatment with neostigmine. Within 10 minutes of neostigmine administration, the patient noted a dramatic improvement in abdominal pain and distension, which was followed by flatus and bowel movement shortly thereafter. Abdominal radiography 12 hours after neostigmine administration revealed dramatically reduced colonic distension (Fig. 4). The patient was observed on bowel rest until the return of function. She was discharged home in good condition, and she reported continued normal bowel function at her follow-up appointment 1 week later.

**Discussion**

Sir William Ogilvie first described the syndrome of colonic pseudo-obstruction in 1948 in a series of two patients with tumor invasion of the celiac plexus. At that time he theorized the cause to be sympathetic denervation of the colon. There have since been numerous theories regarding the etiology of the syndrome, including loss of sympathetic stimulation, prostaglandin abnormalities, transient ischemia, mechanical air-fluid lock of the bowel, diminished parasympathetic stimulation, and/or autonomic imbalance. While the underlying pathophysiology remains unclear, the syndrome is characterized by decreased gastrointestinal motility with massive colonic dilation in the absence of mechanical obstruction and with limited small bowel involvement. This distinguishes the syndrome from severe postoperative adynamic ileus, which affects the small bowel and does not respond well to neostigmine. Treatment of Ogilvie’s syndrome must be undertaken to prevent bowel ischemia and perforation, which carries a high mortality rate as noted above.

Numerous conditions have been associated with Ogilvie’s syndrome, including advanced age, postpartum state, alcohol abuse, narcotic use, irregular bowel habits, laxative abuse, bed rest, diabetes mellitus, congestive heart failure, uremia, hypokalemia, critical illness, sepsis, and trauma. Several studies have suggested endogenous opioid release following surgical stress as a potential cause. In neurosurgical cases, colonic pseudo-obstruction has been associated with complex spine surgery and craniotomies but has also been reported in basic lumbar and cervical discectomies. Ogilvie’s syndrome has also been associated with other neurological diseases, including Parkinson’s disease, brain injury, multiple sclerosis, stroke, meningitis, and Guillain-Barré syndrome.
Ogilvie’s syndrome is rare in adults and occurs even less frequently in the pediatric population. Description of Ogilvie’s syndrome within the pediatric literature is limited to a small number of case reports. These reports describe disease risk factors similar to those in adults, including malignancy, sepsis, systemic illness, electrolyte imbalances, narcotic usage, and surgery. Although the explanation for a higher incidence in the adult population remains unclear, this discrepancy suggests a difference in pediatric physiology and/or age-related changes in colonic motility.

Early diagnosis is essential for the successful treatment of Ogilvie’s syndrome. The cecum is the thinnest-walled portion of the colon with the greatest diameter. Rapid cecal dilation or a cecal diameter larger than 11–13 cm has been associated with an increased risk of cecal ischemia, necrosis, and perforation. As a result, treatment in adults should be initiated at a cecal diameter greater than 9 cm. However, the relative rarity of the disease and age-related variations in colonic size make it difficult to establish an equivalent threshold in the pediatric population. Once a bowel obstruction has been ruled out with appropriate imaging, early treatment of Ogilvie’s may include bowel decompression via nasogastric suction, cessation of any oral intake, laxatives, enemas, promotility agents, limitation of narcotic medication, and rectal tube placement. Many cases will resolve spontaneously over a few days with this conservative treatment regimen. When required, more aggressive treatments consist of colonoscopic decompression, cecostomy, or right colon resection. The latter are typically reserved for cases of bowel perforation.

Neostigmine is a parasympathomimetic that acts as a reversible acetylcholinesterase inhibitor that can be used if bowel ischemia and/or perforation have been excluded. It was first used in 1969 for the treatment of ileus and has been demonstrated to enhance colonic propulsion and accelerate gastrointestinal transit time. It has been extensively tested with good results in critically ill adults with acute colonic pseudo-obstruction; however, its use in children for this purpose has been limited to case reports. Potential side effects of the medication include cholinergic bronchospasm and bradycardia. In the featured case we treated our patient with 0.1 mg glycopyrronium bromide prior to the 0.04-mg/kg neostigmine bolus; however, one report suggests infusing at 0.025–0.1 mg/kg cautiously with the potential use of atropine for symptomatic bradycardia. Regardless of the specific treatment regimen, we recommend monitoring in an intensive care setting prior to neostigmine administration because of the potential side effects of bradycardia, hypotension, and bronchospasm. The presence of any of these factors prior to treatment represents a relative contraindication to neostigmine use, while underlying bowel perforation is an absolute contraindication.

Ogilvie’s syndrome has been described in only one other case following adolescent scoliosis surgery; however, diagnosis in that case was delayed, leading to bowel perforation. Given our experience, we recommend heightened suspicion and close clinical evaluation when signs of bowel function do not return after the average postoperative ileus duration of 48–72 hours.
habits do vary greatly between individuals, and thus a thorough preoperative bowl habit history should be obtained to grade an individual’s postoperative motility issues. Although it was unlikely to change the patient’s clinical course significantly, we believe, in retrospect, that we should have consulted the pediatric surgery service 24 hours earlier. Since there is no clearly defined time threshold for postoperative ileus to resolve in pediatrics, pediatric surgery consultation is recommended when ce-cal dilation is present and clinical suspicion is high. Lastly, this case demonstrates that this rare syndrome can be medically treated even in the setting of a 15-cm cecum when perforation has been ruled out.

Conclusions

Ogilvie’s syndrome is a rare complication following adolescent spinal surgery. Patients with prolonged symptoms of postoperative ileus should be closely monitored with a high index of suspicion. Neostigmine can be safely used with close monitoring and is associated with successful outcomes in pediatric patients.

Disclosure

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Author contributions to the study and manuscript preparation include the following. Conception and design: Pincus. Acquisition of data: Hooten, Oliveria. Analysis and interpretation of data: all authors. Drafting the article: Hooten. Critically revising the article: all authors. Reviewed submitted version of manuscript: all authors. Approved the final version of the manuscript on behalf of all authors: Hooten.

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