Pediatric Spinal cord astrocytoma: a unique presentation of abdominal pain

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ABSTRACT

A previously healthy male presented at age 5 years with recurrent abdominal pain that occurred diffusely. The pain was severe enough to cause episodic screaming, especially at night with spontaneous resolution. The patient was initially treated for constipation but when motor symptoms began to develop, imaging revealed the cause of his pain to be a spinal cord mass. The tumor was treated with steroids, and biopsy confirmed a grade II spinal cord astrocytoma. We describe this unusual presentation of a pediatric spinal cord astrocytoma and review the literature.

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Introduction

Recurrent abdominal pain is a common ailment in pediatrics. In the United States, around 15% of children school-aged and older complain of abdominal pain. For up to a quarter of these children, the pain interferes with their everyday activities. The initial differential diagnosis encompasses a wide range of etiologies depending on the presenting symptoms, location, and type of pain. This includes diagnoses such as constipation, functional abdominal pain, and gastroesophageal reflux. Other less common causes include oncological processes such as intra-abdominal masses and, even rarer, extra-abdominal tumors. Here, we describe one of only a few reported instances of recurrent pediatric abdominal pain caused by a spinal cord astrocytoma and perform a review of the literature [1,2].

Case description

This is a 5-year-old male with no significant past medical or family history who presented with severe abdominal pain. The pain was described as periumbilical, intermittent, and worse when lying down. Due to infrequent, hard bowel movements, his symptoms were attributed to constipation and the patient was given daily laxative therapy.

Despite improved frequency and caliber of bowel movements, the patient continued to have abdominal pain that significantly disrupted his sleep. Initial physical examination, including abdominal and neurologic examinations with deep tendon reflexes, did not show any abnormalities. An abdominal/pelvic CT scan was performed to evaluate for an intra-abdominal process which showed a distended colon filled...
with stool and an incidental short segment small bowel intussusception which self-resolved. Laboratories, including a complete blood count, complete metabolic panel, erythrocyte sedimentation rate, and C-reactive panel, were also normal. Due to persistence of his pain, the patient underwent an upper endoscopy and colonoscopy which did not reveal any significant findings.

Two days after his colonoscopy, the patient developed left foot drop, weakness, and an inability to move his toes. He also experienced new onset urinary incontinence. The patient was evaluated by neurology and found to have decreased lower extremity strength (left worse than right), absent lower extremity reflexes, and left foot drop with normal upper extremity reflexes and sensation. Emergent MRI of the lower thoracic and lumbosacral spine demonstrated an intramedullary spinal cord mass extending from his thoracic to lumbar spine (T6 to L1) with an associated syrinx extending up to the brainstem (Figs. 1 and 2). The patient was subsequently started on corticosteroids and underwent laminoplasty from L2 to T6 to debulk the tumor and provide a definitive diagnosis of the lesion. Immediate resolution of abdominal pain occurred after steroid treatment. Pathology confirmed a grade II astrocytoma. Subsequent follow-up with the patient after several weeks in rehabilitation revealed significant neurologic improvement with resolution of foot drop and incontinence. Postoperative imaging

![Fig. 1 – Initial axial T1 MRI showing tumor and enlarged spinal cord (yellow circle).](image1)

![Fig. 2 – T1 sagittal MRI at presentation of neurologic symptoms. Tumor is within yellow circle. Syrinx is in between yellow arrows.](image2)
reveals minimal residual tumor and shrinkage of the syrinx (Figs. 3 and 4).

Discussion

Spinal cord tumors are a rare finding in the world of pediatric oncology, constituting only about 10% of all pediatric central nervous system tumors [4]. Within these rare cases, astrocytomas are the most frequent type of pediatric spinal cord neoplasms. Most cases in the pediatric population are low grade (around 85%) as opposed to adults who mostly develop high-grade tumors. The tumors usually invade the cervical spine; however, as seen in our patient, the thoracic area is the second most common. While the neoplasms often span less than 4 vertebral bodies, they can be found at multilevel sites, as was seen in this case [4,5].

Astrocytomas are slow growing tumors, taking several months to years between presenting symptoms and diagnosis [6]. The initial manifestation is commonly diffuse back pain (up to 2/3 of patients) that worsens with lying down, leading to complaints of nighttime pain [4,6]. Our patient was unique in that he complained of abdominal pain and not back pain. He would point to his abdomen when asked to locate the source of his pain and repeatedly denied any back symptoms. This may be attributed to poor localization skills of a young child or an unusual pattern of referred pain. In a review of 73 pediatric spinal cord astrocytoma cases in France between 1971 and 1994, 89% presented with back pain, 78% with gait disturbances, 32% with sphincter disturbances or upper limb weakness, and less than 10% with headaches and hypotonia [7]. Our patient did not initially present with any of these symptoms; however, our patient did eventually develop gait disturbance in the form of a foot drop. The onset of this symptom after exposure to anesthesia may have been causative or coincidental.

There are only a few reported cases of pediatric spinal cord astrocytomas presenting with abdominal pain [2]. In one of the earliest documented cases, the researchers concluded that a spinal cord mass is more likely to be the cause of abdominal pain when accompanied by progressive paralysis and a sensory level [3]. Our case differed from the ones described in a few ways: the initial neurologic examination was normal followed by development of hyporeflexia and unilateral weakness without positive Babinski sign and with no presenting nausea or vomiting. All of the tumors occupied at least a portion of the thoracic spine, as was the case in our patient. Only 1 patient had neurologic signs at the initial presentation (stooped gait), but most had at least one at diagnosis. This is similar to the progression of our patient’s symptoms. Initial diagnoses included constipation (as in our patient), IBS, abdominal epilepsy, and SMV thrombus. At diagnosis, physical examination was normal for only 1 patient. Three displayed hyperreflexia, 3 had thoracic scoliosis, and 2 had a positive Babinski sign [2]. This is where our patient differs; his examination at diagnosis revealed hyporeflexia and unilateral weakness without positive Babinski sign.

Pediatric spinal cord tumors are rare, and a presenting symptom of abdominal pain is even less frequently seen. When faced with a patient with recurrent abdominal pain with no discernable intra-abdominal etiology, extra-intestinal causes such as space occupying lesions should be considered. This case highlights the importance of a detailed neurologic examination. However, the absence of any focal neurologic deficits at the initial or early presentation should not rule out a spinal tumor as all the reported cases presented initially without any neurologic issues. This raises the question of the utility of doing spinal imaging, in particular MRI on patients with persistent abdominal pain. The arguments for this suggestion would be the lack of radiation exposure from an MRI as well as the potential for early diagnosis of a disease whose cure rate is dependent on the ability to have total resection [7]. The equally valid arguments against such a protocol would be the high cost of MRI scans, necessity for sedation/anesthesia as well as the risks associated with this in young children as well as the small number of patients with abdominal pain who ultimately do have a mass. Therefore, consideration of a MRI should be taken on a case-by-case basis with careful analysis of the risks and benefits of the imaging modality. In conclusion, this was a unique presentation of a disease process that if caught early enough, it has a good prognosis. As such, providers should be aware of all possible presentations and be aware of the benefits and risks of evaluating for spinal tumors when patients present with unidentified recurrent abdominal pain.
Fig. 4 – Postoperative T1 sagittal MRI. Syrinx (between arrows) is reduced. Minimal remaining tumor is within yellow circle.
REFERENCES

[1] Schurman JV, Kessler ED, Friesen CA. Understanding and treatment of chronic abdominal pain in pediatric primary care. Clin Pediatr 2014;53:1032–40.

[2] Van Hooren TA, Howard J. Abdominal pain: an unlikely presentation of paediatric spinal cord tumour. J Pediatr Gastroenterol Nutr 2015;60:e3–5.

[3] Eeg-Olofsson O, Carlsson E, Jeppsson S. Recurrent abdominal pains as the first symptom of a spinal cord tumor. Acta Paediatr Scand 1981;70:595–7.

[4] Smith AB, Soderlund KA, Rushing EJ, Smimiotopolous JG. Radiologic-pathologic correlation of pediatric and adolescent spinal neoplasms: part 1, intramedullary spinal neoplasms. Am J Roentgenol 2012;198:34–43.

[5] Townsend N, Handler M, Fleitz J, Foreman N. Intramedullary spinal cord astrocytomas in children. Pediatr Blood Cancer 2004;43:629–32.

[6] Houten JK, Cooper PR. Spinal cord astrocytomas: presentation, management and outcome. J Neurooncol 2000;47:219–24.

[7] Bouffet E, Pierre-Kahn A, Marchal JC, Jouvet A, Kalifa C, Choux M, et al. Prognostic factors in pediatric spinal cord astrocytoma. Cancer 1998;83:2391–9.