

Foreign Body Causing a Neuro-Enteric Fistula and Pneumocephalus

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Abstract

The authors present a case of neuro-enteric fistula formation in a patient with a toothpick ingestion. Head computed tomography scans (CT) demonstrated pneumocephalus and mild lateral ventricular dilatation. Pelvic CT scans were significant for air within the subarachnoid space in multiple spinal levels as well as a foreign body in the distal colon extending into the left presacral space, resulting in fistula formation.

Categories: Radiology, Neurosurgery

Keywords: pneumocephalus, meningitis, foreign body, neuro-enteric fistula

Introduction

Neuro-enteric fistulas have been reported as resulting from congenital malformations as well as secondary to inflammatory processes, such as diverticulitis [2-3]. Neuro-enteric fistula formation presenting as meningitis and pneumocephalus due to a foreign body has not been previously documented in the literature. We report a case of an elderly patient who presented with an E. coli meningitis and pneumocephalus, presumably flatulence, from a toothpick that had perforated his distal sigmoid colon in the presacral area.

Case Presentation

A 66-year-old man presented to the emergency department with a fever to 103°F, nuchal rigidity, altered mental status, and recent recurrent syncopal episodes with associated nausea, vomiting, and dizziness. The patient had also been complaining of increasingly severe lower back pain. His past medical history was significant for sigmoid diverticulosis and a recurrent anal fistula, which had been surgically corrected years prior without subsequent recurrence. Initial physical exam demonstrated diffuse abdominal tenderness, nuchal rigidity, and progressively worsening confusion. A computed tomography (CT) head scan without contrast demonstrated scattered gas in the intracranial subarachnoid space, and mild dilation of the lateral ventricles (Figure 1).

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FIGURE 1: Figure 1

Upper head CT showing pneumocephalus in ambient cistern (arrow). Lower head CT showing small focus of pneumocephalus in posterior fossa (arrow).

Due to the patient's history of perianal surgery, a pelvic CT without contrast was obtained; pelvic views demonstrated what was thought to be a needle-like object extending from the sigmoid colon into the left presacral space. Air within the subarachnoid space of the spinal canal was also appreciated (Figure 2).

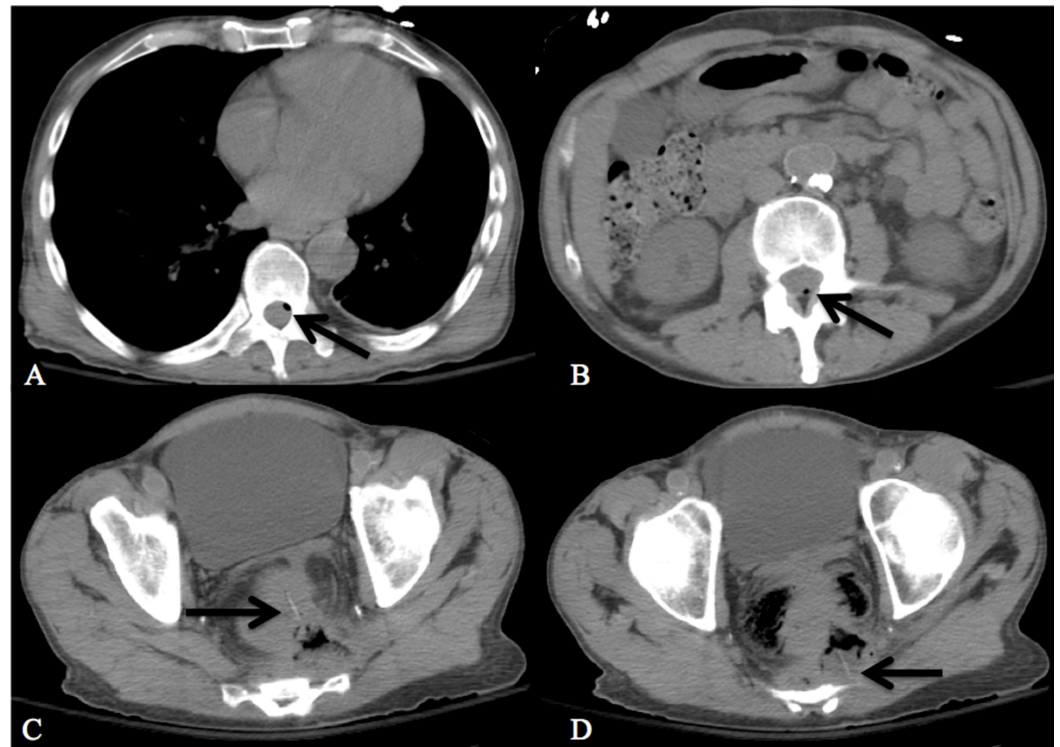


FIGURE 2: Figure 2

A and B: Transverse abdominal CT without contrast showing air in the subarachnoid space (arrows) at thoracic and lumbar vertebral levels. C and D: Foreign object (toothpick) in colon extending to left presacral space (arrows).

The impression at this time was that a foreign body, as evidenced on the pelvic CT scan, had penetrated into the subarachnoid space through a sacral foramen and subsequently caused a fistula formation with the sigmoid colon. A lumbar puncture was performed and produced thick, cloudy cerebrospinal fluid (CSF) with unknown opening pressure. The patient was started on empiric therapy with vancomycin, piperacillin, tazobactam, ciprofloxacin, and metronidazole. Initial labs showed a leukocytosis with a peripheral white blood cell (WBC) count of 41.7×10^3 with predominantly neutrophils (92%) and a developing bandemia. The CSF WBC count was in excess of 20×10^3 with 92% neutrophils (and the presence of intracellular bacteria), a red cell count of 1200, and a total protein of 3701 mg/dL. CSF cultures were positive for extended-spectrum beta-lactamase producing *E. coli*, and the patient was started on a course of IV meropenem.

Two flexible sigmoidoscopies were later performed and were unable to identify a foreign body. Laparoscopic exploration of the recto-sigmoid area revealed a wooden toothpick creating an inflammatory mass in the sigmoid colon in communication with the presacral root plexus on

the left. Due to the extensive recto-sigmoid dissection and pelvic adhesions, a left descending end colostomy was created. He tolerated the procedure well.

A signed informed patient consent was obtained for all procedures.

His mental status improved progressively on antibiotics, and a follow-up head CT demonstrated resolution of the pneumocephalus and lateral ventricle dilation.

Discussion

Cerebrospinal fluid fistulas may occur after an insult to the dura mater that exposes the arachnoid. The more common causes include durotomies during surgery, penetrating trauma or other open fractures of the cranium or spine, or due to a congenital abnormality. CSF leak can result in formation of a fistula, predisposing to infection if the fistula connects to the outside or to a contaminated space [1].

A fistulous connection from the subarachnoid space to the bowel is exceedingly rare. Such neuro-enteric fistulas can have various etiologies. They can result from congenital malformations, due to persistence of embryonic neural and intestinal tissues, which is thought to result from a condition called "split notochord syndrome." In these instances, a neuro-enteric fistula should be suspected when children present with meningitis from an anaerobic organism in the absence of other local organ-system infections [2].

There is one reported case of an inflammatory neuro-enteric fistula resulting from a diverticular abscess in the sigmoid colon in an elderly female. The abscess was adherent to the sacrum and communicated with the subarachnoid space via the sacral foramina, much like the above presented case. The current patient also presented with non-traumatic pneumocephalus, and so a neuro-enteric fistula was considered as a possible etiology [3].

After exploring the available literature, it is our understanding that this case is the first reported instance of a neuro-enteric fistula due to an ingested foreign body violating the spinal subarachnoid space. The presence of pneumocephalus in this patient in the absence of trauma should raise suspicion of subarachnoid communication with an air-filled space.

Conclusions

After exploring the available literature, it is our understanding that this case is the first reported instance of a neuro-enteric fistula due to an ingested foreign body violating the spinal subarachnoid space. The presence of pneumocephalus in this patient in the absence of trauma should raise suspicion of subarachnoid communication with an air-filled space.

Additional Information

Disclosures

Human subjects: Consent was obtained by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following:

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