

Esophageal carcinoma as a portal of entry for brainstem abscess formation

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Abstract

Cerebral abscess formation is a serious and life-threatening clinical entity, secondary to contiguous spread, hematogenous dissemination or direct inoculation. We present the case of a 61-year-old woman with a recent diagnosis of a locally advanced squamous cell carcinoma of the esophagus who was diagnosed with a brainstem abscess. In literature we only found three cases reporting cerebral abscess formation in patients with esophageal carcinoma. Our case report is considered exceptional given the abscess localization in the pons. The abscess was successfully treated with stereotactic drainage and antibiotics. This report emphasizes the importance of gastrointestinal tract evaluation in patients with diagnosis of cerebral abscess when no other cause is found. Brain abscesses must be recognized as a potentially fatal complication of esophageal carcinoma. (*Acta gastroenterol. belg.*, 2022, 85, 105-107).

Keywords: brain abscess, esophageal carcinoma.

Introduction

Brain abscess formation is a potentially fatal condition with an estimated yearly incidence rate of 0.4 per 100.000 population (1). Despite improvements in cerebral imaging techniques, broad-spectrum antibiotics and minimally invasive neurosurgical procedures the mortality rate remains high up to 15% (2).

Following diagnosis of a cerebral abscess, a predisposing condition or primary focus is often identified. However, in upon 19-27% of cases the etiology remains unknown, classified as cryptogenic abscesses (1,2).

The esophagus as a possible source of intracerebral abscess formation is described in a few cases of patients who underwent esophageal dilatation (3-5), endoscopic treatment of esophageal varices (6-8) or after removal of a foreign body (9).

We present the case of a 61-year-old patient with a recent diagnosis of a locally advanced squamous cell carcinoma of the esophagus who was diagnosed with a brainstem abscess. In literature we only found three cases reporting cerebral abscess formation in patients with esophageal carcinoma (10-12), of which this is the first localized in the pontine region.

Case History

A 61-year old patient consulted the emergency department with unilateral sensible deficit.

Two months prior to this admission the patient was diagnosed with a locally advanced squamous cell carcinoma of the esophagus following complaints of progressive dysphagia. Gastroscopy revealed a concentric stenotic tumor of the proximal esophagus, anatomopathologically described as a squamous cell carcinoma.

Imaging with CT-Thorax and CT-abdomen, PET-CT and liver MRI could exclude distant metastasis. Clinical staging concluded cT3N1M0 (stage IIIA). The decision was made to start neo-adjuvant concomitant radiochemotherapy with weekly administration of Carboplatinum/Paclitaxel and concurrent radiotherapy following optional salvage surgery.

One week prior to the start of therapy the patient consulted the emergency department with headache, balance impairment and paresthesia of the left hand and left foot. Clinical neurological examination revealed a normal mental status and function of the cranial nerves. Left-sided sensory loss, mild ataxia of the upper and lower limb and Babinski sign suggested central nervous system involvement.

Additional cerebral MRI showed a solitary annular contrast-enhancing lesion posterocentrally in the pons with central diffusion restriction and pronounced perilesional edema, suggestive for a cerebral abscess (17 x 14 x 17 mm) (Figure 1).

Given the high risk of complications secondary to neurosurgical intervention an initial conservative strategy was proposed. Empirical broad-spectrum antibiotic treatment was started with Ceftriaxone 2 g bid in combination with Metronidazole 500 mg tid. A transthoracic echography was performed which showed no signs of endocarditis. Dental and ear-nose-throat examinations were normal.

Two days after initiation of antibiotics the patient developed progressive neurological symptoms with new onset diplopia. Neurological evaluation showed new-onset right sided n. VI palsy. Urgent MRI of the brain

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Submission date: 12/11/2020
Acceptance date: 03/01/2021

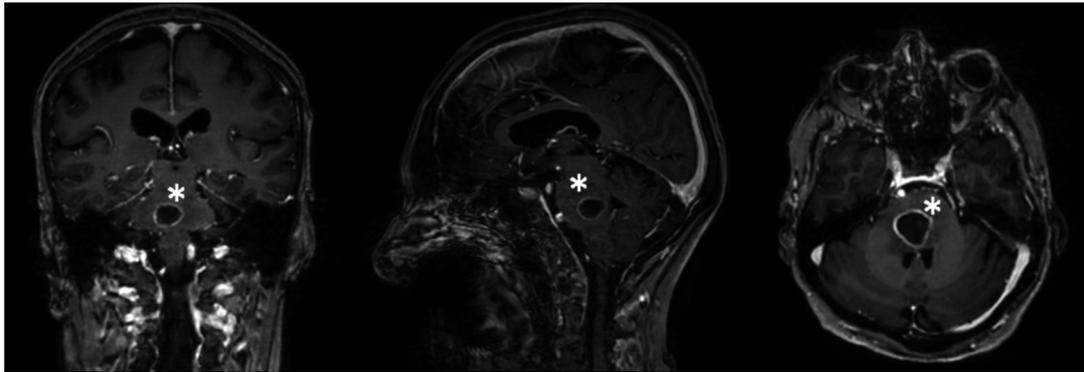


Figure 1. — MRI brain imaging (3D-T1 after intravenous administration of Gadolinium) shows a large ring-enhancing lesion in the pons with perilesional edema (*).

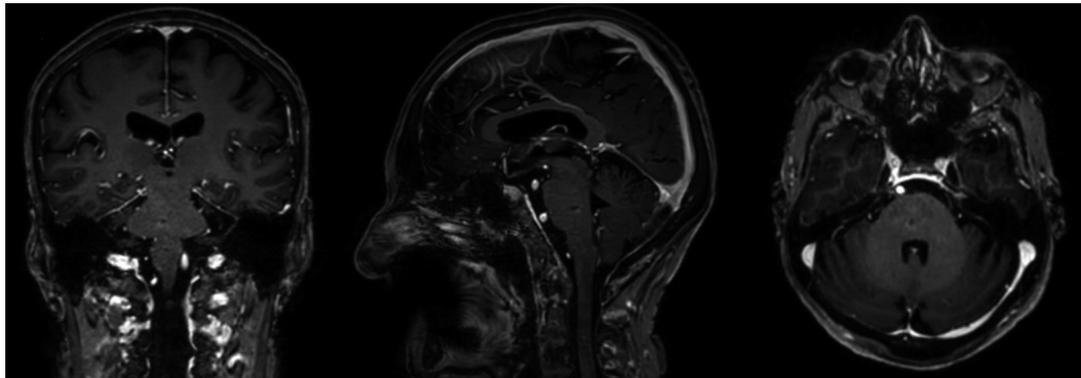


Figure 2. — MRI brain imaging two months after stereotactic drainage and antibiotic treatment shows complete resolution of the abscess with only minimal residual signal changes.

showed an increase of the pontine abscess (20 x 15 x 18mm), explaining these new brain stem symptoms.

Prompt stereotactic neurosurgery was successfully performed with aspiration of 3 mL pus. Bacterial and fungal cultures of the abscess were negative. Post-operatively, antibiotic treatment was escalated to Meropenem 2 g tris, Aztreonam 2 g qd and Metronidazole 500 mg tris for 4 weeks. Significant neurological recovery with resolution of the right-sided n. VI palsy and marked improvement of the left-sided sensory symptoms was observed. Consolidation therapy with Ceftriaxone 2g bis and Metronidazole 500 mg tris was administered for another 4 weeks. Concomitant radiochemotherapy was initiated during this antibiotic consolidation period and was not postponed with the goal for oncological curative. Reevaluation with MRI demonstrated complete resolution of the abscess (Figure 2).

Discussion

Cerebral abscess formation can occur due to hematogenous spread of bacteria which is often attributed to underlying cardiopulmonary disease (e.g. endocarditis) or distant foci of infection, contiguous spread from surrounding tissue (e.g. dental infections, sinusitis, mastoiditis) or due to direct inoculation (e.g. neurosurgery, head trauma). A primary source of infection as an origin for bacterial dissemination is mostly identified, however

in a substantial amount of cases a clear etiology cannot be withheld (1,2).

In literature, the esophagus as a portal of entry for brain abscesses is described in a few case reports following esophageal dilatation(3-5) and treatment of esophageal varicose veins with either endoscopic ligation (7) or sclerotherapy (6,8). In one case the formation of cerebral abscess was described in a pediatric patient after endoscopic removal of a foreign body in the esophagus (9).

It is of interest to highlight that interventional endoscopic therapy preceded cerebral abscess formation in those patients. Bacterial translocation to the bloodstream theoretically can occur after every endoscopic procedure, with the highest rates of bacteremia reported in esophageal dilation, sclerotherapy of varices and instrumentation of obstructed bile ducts (13). However, given the fact that endoscopy-related bacteremia only carries a small risk of infection in remote tissues, and clinically significant infections are considered rare, the European Society of Endoscopy (ESGE) only recommends systematic antibiotic prophylaxis in high risk endoscopic procedures performed in patients at high risk for infectious complications (14).

Our case report strengthens the hypothesis of the esophagus as a possible portal of entry for brain abscess. Although our patient underwent a gastroscopy with tumor biopsies, no major interventional endoscopic procedures were performed.

Table 1.

Author	Patient	Primary focus	Abscess location	Treatment	Pathogen
Hanna et al. 2013 ¹⁰	46 year, male	Adenocarcinoma of the distal esophagus (cT3N1M0)	Left frontoparietal and right parietal lobe	Neurosurgical drainage followed by antibiotic treatment Left frontal lobectomy	Streptococcus intermedius
Nayfe et al. 2017 ¹²	53 year, female	Squamous cell carcinoma of the mid-esophagus (mediastinal and hilar lymphadenopathy)	Right thalamic region	Neurosurgical drainage followed by antibiotic treatment	Streptococcus intermedius
Mackay et al. 2019 ¹¹	58 year, male	Squamous cell carcinoma of the esophagus (mediastinal lymphadenopathy, mesenteric and bone metastasis)	Multiple supratentorial lesions; ventriculitis	Diagnostic cerebrospinal fluid analysis followed by antibiotic treatment	Beta hemolytic Streptococcus

To date, only three case publications of esophageal carcinoma with subsequent cerebral abscess formation were reported (10-12) (table 1). As described in our case, abscess formation was discovered recently after the patient was diagnosed with esophageal cancer. Baseline oncological staging did not include imaging of the brain, since neurological symptoms were absent in that period. In two cases the diagnosis of cerebral abscess preceded the identification of esophageal malignancy (10,12).

Bacterial dissemination from the esophagus might be explained by bacterial translocation provoked by mucosal barrier disruption due to tumor growth or previous endoscopic intervention.

One limitation of our case report is the failure of microorganism identification, presumably due to prompt initiation of antibiotic therapy. In two cases reporting esophageal carcinoma as a precedent, the pathogen *Streptococcus intermedius* was isolated from abscess cultures (10,12). This gram-positive bacterium is an anaerobic commensal in the gastro-intestinal tract suggesting bacterial translocation as a possible mechanism for bacterial dissemination.

The possible route through which bacteria may spread to the central nervous system, is the vertebral venous plexus or Batson's plexus, connecting esophageal venules with the cerebrospinal venous system (15). This valveless network with bidirectional blood flow is recognized as a potential route of transmission for hematogenous metastasis and might also play an important role in the spread of infection. It is of interest that no cases of gastric malignancy preceding cerebral abscess are reported, which might imply a different mode of bacterial transmission in the esophagus.

Due to neurological deterioration urgent stereotactic aspiration was decided upon which resulted in a favorable outcome. To our knowledge, the current case is the first to describe a brain stem abscess in a patient with esophageal pathology as a primary source of infection.

Although infrequent, brain abscesses must be recognized as a potentially fatal complication of esophageal cancer. Vice versa, evaluation of the gastro-intestinal tract in patients with diagnosis of cerebral abscess is recommended when no other source of infection is found.

Conflict of interest

No financial disclosures or conflict of interest. No funding sources.

References

- HELWEG-LARSEN J, ARSTRADSSON A, RICHHALL H, ERDAL J, LAURSEN A, BRENNUM J. Pyogenic brain abscess, a 15 year survey. *BMC Infectious Diseases*, 2012, **12**: 332-42.
- BROUWER M, COUTINHO J, VAN DE BEEK D. Clinical characteristics and outcome of brain abscess: systematic review and meta-analysis. *Neurology*, 2014, **82**: 806-13.
- GAINI S, GRAND M, MICHELSEN J. Brain Abscess after Esophageal Dilatation: Case Report. *Infection*, 2008, **36**: 71-3.
- ALGOED L, BOON P, DE VOS M, VAN DEN ABEELE K, SANTENS P, DE REUCK J, et al. Brain abscess after esophageal dilatation for stenosis. *Clinical Neurology and Neurosurgery*, 1992, **94**: 169-72.
- VAN EVEN E, BOEL A, VAN VAERENBERGH K, DE BEENHOUWER H. Brain abscesses with peptostreptococcus: not unusual after oesophageal dilatation. *Acta Clinica Belgica*, 2012, **67**(4): 292-4.
- COHEN F, KOERNER R, TAUB S. Solitary brain abscess following endoscopic injection sclerosis of esophageal varices. *Gastrointest. Endosc.*, 1985, **31**(5): 331-3.
- SHIH H, LEE H, CHUANG C, KO W. Fatal Klebsiella pneumoniae meningitis and emphysematous brain abscess after endoscopic variceal ligation in a patient with liver cirrhosis and diabetes mellitus. *J. Formos. Med. Assoc.*, 2006, **105**(10): 857-60.
- WANG W, CHEN C, JAN C. Central nervous system infection after endoscopic injection sclerotherapy. *Am. J. Gastroenterol.*, 1990, **85**(7): 865-7.
- LOUIE J, OSTERHOUDT K, CHRISTIAN C. Brain abscess following delayed endoscopic removal of an initially asymptomatic esophageal coin. *Pediatr. Emerg. Care.*, 2000, **16**: 102-5.
- HANNA M, DAS D. Oesophageal adenocarcinoma presenting with multiple *Streptococcus intermedius* cerebral abscesses. *J. Gastrointest. Cancer.*, 2014, **45**: 18-21.
- MACKAY C, CHEN Y. Ruptured cerebral abscess with ventriculitis and leptomeningitis; A rare complication in the setting of metastatic esophageal cancer: case report and literature review. *Radiology Case Reports*, 2019, **14**: 782-5.
- NAYFE R, ASCHA M, REHMUS E. Esophageal Squamous Cell Carcinoma Presenting with *Streptococcus intermedius* Cerebral abscess. *Case Rep. Pathol.*, 2017, **2017**: 5819676.
- NELSON D. Infectious disease complications of GI endoscopy: Part I, endogenous infections. *Gastrointest. Endosc.*, 2003, **57**: 546-56.
- REY J, AXON A, BUDZYNSKA AK, A., NOWAK A. Guidelines of the European Society of Gastrointestinal Endoscopy (E.S.G.E.) Antibiotic Prophylaxis for Gastrointestinal Endoscopy. *Endoscopy*, 1998, **30**: 318-24.
- BATSON O. The Function of the vertebral veins and their role in the spread of metastases. *Ann. Surg.*, 1940, **112**(1): 138-49.