Rectal dural metastasis masquerading as chronic subdural hematoma: illustrative case

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BACKGROUND Intracranial dural metastasis causing subdural hematoma formation is a rare clinical entity associated with significant morbidity and mortality. A 61-year-old female patient known to have rectal signet ring cell carcinoma presented with cranial computed tomography scan findings of bilateral subdural hematoma. She underwent evacuation of the hematoma with dural biopsy, which showed tumor emboli consistent with colorectal origin. There was an early recurrence of the subdural collection, and an emergency subdural-peritoneal shunt insertion was done; however, there was no sustained clinical improvement. This work reports the first case of rectal dural metastasis presenting as chronic subdural hematoma and discusses the clinical course and current literature.

OBSERVATIONS The cases described in these studies are consistent with the clinical course of our patient; that is, evacuation of the subdural hematoma provided temporary clinical improvement and re-accumulation occurred within 3 days.

LESSONS The authors recommend maintaining a high index of suspicion in this select group of patients, including prompt discussion about treatment plans with the patient’s family.

https://thejns.org/doi/abs/10.3171/CASE2316

KEYWORDS dural metastasis; subdural hematoma; rectal carcinoma; subdural effusion; metastatic disease

Intracranial dural metastasis is not a rare finding in autopsies, with studies reporting an incidence of 8%–9%. However, reports among living patients have been sparse. A review of the literature done by Laigle-Donadey et al.1 included 198 cases, and among these, the most common primary malignancies to metastasize to the dura were prostate (19.5%), breast (16.5%), lung (11%), and stomach (7.5%) cancers. In this study, only two had colorectal cancer as the primary cancer. In addition to the rare occurrence of intracranial dural metastasis, reports about patients presenting with subdural hematoma have been even more infrequent, with a 4% incidence in a study among patients with subdural hematoma and active cancer at the Memorial Sloan Kettering Cancer Center.

In colorectal carcinoma, regional lymph node involvement is the most common form of spread and usually precedes distant metastasis or the development of carcinomatosis. The most common site of distant metastasis is the liver. Rectal carcinoma spreading to the brain is rare, with an incidence ranging from just 1% to 3%.2 There have been several reports of colorectal dural metastasis; however, to our knowledge, this is the first study reporting a patient presenting with subdural hematoma.

The patient is a known case of rectal signet ring cell carcinoma who presented with bilateral chronic subdural hematoma, and histopathological analysis of the cranial dura mater revealed tumor emboli consistent with the primary malignancy.

Illustrative Case

A 61-year-old female presented with alteration in the sensorium. She has a known case of rectal signet ring cell carcinoma stage III (T3N0M0) status post diversion colostomy, 25 sessions of radiotherapy and has been on adjuvant chemotherapy (capecitabine) for 30 days. She complained of headaches and vomiting for 2 days and was rushed to the hospital given the persistence of symptoms. She had no history of recent minor or major trauma, or known blood dyscrasia. On admission, she had a Glasgow Coma Scale (GCS) score of 7 (E1V1M5):
and was anisocoric, with right-sided hemiparesis. Postintubation and after being given a mannitol 300 cc intravenous bolus, she improved to a GCS score of 14 (E3V5M6). A cranial computed tomography (CT) scan (Fig. 1) revealed bilateral frontoparietal acute on chronic subdural hema-
toma, with a 1.2-cm widest diameter on the right and 1.0 cm on the left. Incidentally, as a requirement for admission, coronavirus disease 2019 (COVID-19) testing was done and yielded a positive result. Laboratory tests showed normal blood count, coagulation parameters, and electrolytes. As the patient had presented with progressive neurological deteriora-
tion coupled with the radiographic findings that were compatible with the patient’s clinical presentation, the decision was made to perform emergency evacuation of the hematoma. Further imaging was not done since, at the time of assessment, the patient had presented with classic signs and symptoms of chronic subdural hematoma, even without having recalled any inciting trauma.

Surgical evacuation of the bilateral subdural hematoma was done through burr holes bilaterally. Upon exposure of the dura on the left side, it was noticeably thickened compared with the right side on gross inspection, a finding that was not conspicuous radiographically. On the background of a patient with a known primary malignancy, a dural biopsy sample was then taken from the left parietal area and sent for histopathological analysis. The dura measured 1.0 × 1.0 × 0.1 cm on gross examination with no visible tumor. Microscopic ex-
amination (Fig. 2) revealed fibrocollagenous tissues with few neutro-
philic infiltrates. Small clusters of atypical cells were seen within the lymphovascular spaces that were suspicious for tumor emboli.

Figure 3 shows the immunohistochemical staining, which showed the cells as CK7−, CK20−, and CDX2+, favoring the upper and lower gastrointestinal tract, liver, and kidney as primary sites, supporting the diagnosis of rectal intracranial dural metastasis in a known case of rectal adenocarcinoma. The subdural hematoma was also sent for analysis and was negative for malignant cells. The patient showed immediate clinical improvement postoperatively.

COVID-19 ancillaries showed elevated ferritin, LDH, hsCRP, interleukin-6, and d-dimer. The patient was clinically stable, with minimal headache and a GCS score of 15. On the third postoperative day, she had decreased sensorium, persistent headache, and vomiting episodes. Repeat laboratory tests showed a prolonged prothrombin time of 17.7 seconds (normal values: 10.3–14.1 seconds), and repeat cranial CT (Fig. 4) revealed a left frontoparietal subdural effusion measuring 2.0 cm in the widest diameter with a 0.8-cm midline shift. With histopathological findings of suspicious tumor emboli supported by the observation of a relatively thickened dura on the left, together with early fluid collection at the same site, dural metastasis was strongly considered. Because of numerous studies reporting early recurrences, an emergency left subdural-peritoneal shunt insertion was done to...
address this morbidity. The patient again showed clinical improvement in the immediate postoperative period.

During the subsequent days, however, the patient’s condition progressively deteriorated. Complete blood count revealed anemia and thrombocytopenia. The sensorium likewise deteriorated, and 3 days postsurgery, the patient’s family decided to forego further medications, procedures, and intubation. She subsequently succumbed to her disease.

Discussion

Colorectal cancer is the most common malignancy of the gastrointestinal tract. It ranks as the third most lethal cancer in the United States, sixth overall in the Philippines, fifth among males, and seventh among females. Its incidence markedly increases after age 50. Brain metastasis from colorectal cancer is rare, risk factors are poorly understood, and intracranial dural metastasis is an even more infrequent occurrence, with very few reports available in the literature. Two routes of tumor embolization have been proposed: via arteries or Batson’s plexus, due to the lack of a venous valve, permitting metastasis.

Kleinschmidt-DeMasters reported a retrospective series covering 1982–2000 in which 33 surgical and 27 autopsy cases were included. Three among 27 (11.11%) of the surgical cases presented with subdural hematoma. Furthermore, among all included cases, only one had a colonic primary, presenting with skull metastasis.

A retrospective review of 122 patients with intracranial dural metastasis diagnosed at Memorial Sloan Kettering Cancer Center between 1999 and 2006 revealed the presence of subdural effusion in only three patients (2%), emphasizing its rare occurrence. Subdural effusion was attributed to the neovascularization of dural metastases exacerbated by thrombocytopenia or coagulation disorders due to underlying cancer or its treatment.

In a review by Yamaguchi et al., 31 patients with active cancer presenting with subdural hematoma were included. Among these, five (16.1%) patients were found to have dural metastasis. The group proposed three mechanisms for subdural hematoma formation among those with intracranial dural metastasis: (1) disruption of areolar neovascularization in the dura mater accompanying tumor metastasis; (2) capillary hypertension due to draining vein occlusion by cancer cells in the dense outer layer, which induces vessel rupture or secretion of plasma components; or (3) hemorrhagic effusion from metastatic lesions due to an angiodysplastic reaction to the metastatic invasion. It is important to note that all five patients in their study experienced an early recurrence of subdural hematoma and death. Likewise, additional invasive procedures did not provide additional benefits; this supports evidence on the poor prognosis among this population, with one report stating a mortality rate as high as 69% within three weeks.

Observations

The cases described in these studies are consistent with the clinical course of our patient; evacuation of the subdural hematoma provided temporary clinical improvement and re-accumulation occurred within 3 days. Because of clinical deterioration, a subdural-peritoneal shunt was inserted to relieve intracranial hypertension and mass effect; however, the procedure only afforded short-term relief. Nayak and colleagues proposed pathogenesis of subdural hematoma formation by neovascularization is supported by the histopathological findings in this study wherein tumor emboli were seen in the arteries, with the hematoma being negative for malignant cells. Another similar manifestation in their study is the concomitant thrombocytopenia and...
coagulation disorder that might have significantly contributed to the morbidity. The latter observation is similar to a case reported by Nagaya et al.\textsuperscript{7}

We recommend a high index of suspicion for intracranial dural metastasis among patients with known cancer presenting with subdural hematoma with no apparent history of head trauma. A dural biopsy might be warranted in these cases,\textsuperscript{9} and if proven positive for metastasis, a prompt multidisciplinary discussion about prognosis and possible palliation with the patient and the family is necessary. Medical decompression might have a role; however, surgical evacuation is still recommended in any instance of intracranial hypertension jeopardizing life, even with the knowledge of high morbidity and mortality.

Lessons
Intracranial dural metastasis presenting as subdural hematoma is a rare occurrence; however, the clinician must have a high index of suspicion in all patients known to have active cancer with no prior head trauma presenting with such radiological findings. In these patients, we recommend timely surgical intervention, including dural biopsy. Investigation for concomitant coagulopathy is likewise emphasized and must be addressed with proper measures. Finally, if proven metastatic in etiology, early discussion with the patient's family about palliation is advocated because of the high morbidity and mortality associated with this disease.

Acknowledgments
We thank the family of the patient who generously gave their consent for this article.

References

Disclosures
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
Conception and design: Siy, Pacia, Ong. Acquisition of data: Siy, Pacia, Ong. Analysis and interpretation of data: Siy, Pacia. Drafting of the article: Siy, Pacia. Critically revising the article: Siy, Pacia, Ong-Lingan, Rosales. Reviewed submitted version of the manuscript: Siy, Pacia, Ong-Lingan, Rosales. Approved the final version of the manuscript on behalf of all authors: Siy. Administrative/technical/material support: all authors. Study supervision: Pacia, Ong.

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