



# Meningeal Carcinomatosis for Prostate Adenocarcinoma Mimicking Chronic Subdural Hematoma: Case Report and Literature Review

## *Carcinomatose meníngea de adenocarcinoma de próstata mimetizando hematoma subdural crônico: Relato de caso e revisão da literatura*

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### Abstract

**Introduction** Cerebral metastases are the most common cancer of the central nervous system (CNS). Meningeal infiltration by neoplasms that did not originate in the CNS is a rare fact that is present in 0.02% of the autopsies.

Epidemiologically, the radiological presentation mimicking a subdural hematoma is even more uncommon. We report a case of meningeal carcinomatosis by an adenocarcinoma of the prostate mimicking a chronic subdural hematoma.

**Case Report** A 60-year-old male patient was diagnosed with prostate cancer in 2011. He underwent radical resection of the prostate, as well as adjuvant hormonal therapy and chemotherapy.

Five years later, the patient presented peripheral facial paralysis that evolved with vomiting and mental confusion. Tomography and magnetic resonance imaging scans confirmed the subdural collection.

At surgery, the dura was infiltrated by friable material of difficult hemostasis. The anatomicopathological examination showed atypical epithelial cells. The immunohistochemistry was positive for prostate-specific antigen (PSA) and other key markers, and it was conclusive for meningeal carcinomatosis by a prostate adenocarcinoma.

**Discussion** Meningeal carcinomatosis presents clinically with headache, motor deficits, vomiting, changes in consciousness and seizures.

The two most discussed mechanisms of neoplastic infiltration are the hematogenous route and retrograde drainage by the vertebral venous plexus.

### Keywords

- ▶ subdural hematoma
- ▶ metastasis
- ▶ adenocarcinoma
- ▶ prostate

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**Conclusion** Variable clinical presentations may occur in dural metastases; however, the radiological presentation as subdural hematoma is rare. There are few descriptions of cases like this one in the literature.

To support the diagnosis, the previous medical history is as important as the complementary exams and the radiological findings, because the symptoms are common at the neurological emergency. To our knowledge, this is the first report of a prostate neoplasm mimicking chronic subdural hematoma in Brazil.

## Resumo

**Introdução** Metástases cerebrais são o tipo mais comum de câncer do sistema nervoso central (SNC). A infiltração meníngea por neoplasias não originárias do SNC é fato raro, estando presente em 0.02% das autópsias.

Epidemiologicamente, a apresentação radiológica mimetizando hematoma subdural é ainda mais incomum. Nós relatamos um caso de carcinomatose meníngea por adenocarcinoma de próstata mimetizando hematoma subdural crônico.

**Relato de Caso** Homem de 60 anos foi diagnosticado com câncer de próstata em 2011. O paciente foi submetido a prostatectomia radical, bem como a quimioterapia e terapia hormonal adjuvante.

Cinco anos depois, ele apresentou paralisia facial periférica, que evoluiu com vômitos e confusão mental. Tomografia e ressonância magnética confirmaram coleção subdural. Na cirurgia, a dura-máter encontrava-se infiltrada por material de difícil hemostasia. O exame anatomopatológico descreveu células epiteliais atípicas. A imunohistoquímica foi positiva para antígeno prostático específico (APE) e outros marcadores-chave, sendo conclusiva para carcinomatose meníngea por adenocarcinoma de próstata.

**Discussão** Clinicamente, esses pacientes apresentam-se com cefaleia, déficit motor, vômitos, alterações do nível de consciência e convulsões.

Os dois mecanismos mais prováveis de infiltração neoplásica são a rota hematogênica e a drenagem retrógrada pelo plexo venoso vertebral.

**Conclusão** Várias apresentações clínicas podem ocorrer em metástases durais; no entanto, mimetizar hematoma subdural é fato raro. Existem poucas descrições de casos como este na literatura.

Para dar apoio ao diagnóstico, o histórico médico prévio, bem como os exames complementares e os achados radiológicos são importantes porque os sintomas são comuns na emergência neurológica. Pelo que sabemos, este é o primeiro relato de neoplasia de próstata mimetizando hematoma subdural crônico no Brasil.

## Palavras-chave

- ▶ hematoma subdural
- ▶ metástase
- ▶ adenocarcinoma
- ▶ próstata

## Introduction

Brain metastases (BM) are the most common type of cancer of the central nervous system (CNS), and are more common in the sixth decade of life. In total, 40% of cancer patients developing metastases have BM, with ~ 200 thousand new cases per year in the United States.<sup>1</sup> The ratio of BM to primary brain cancer is of up to 10:1 cases.<sup>1</sup>

Metastatic meningeal infiltrations are uncommon, occurring in 8% to 9% of the cases in primary extracranial neoplasms. They behave primarily as meningeal expansive lesions usually mimicking meningiomas.<sup>1</sup>

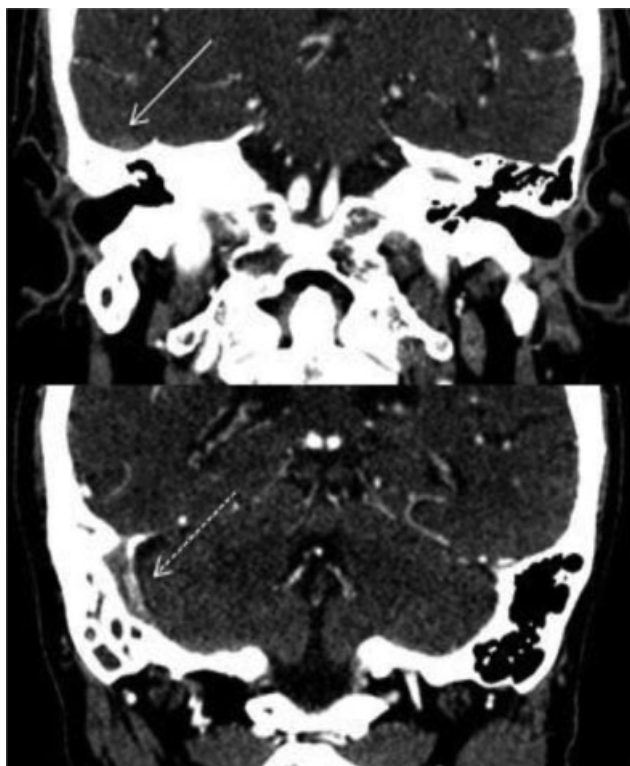
Brain metastases presenting clinically and radiologically mimicking chronic subdural hematomas are very rare,<sup>2-4</sup> and are present in only 0.02% of autopsies of patients with suspicion of metastatic infiltrations of the meninges.

In the present paper, we report a case of prostate adenocarcinoma that presented as meningeal carcinomatosis, with clinical and radiological aspects of a chronic subdural hematoma, and we perform an extensive literature review.

## Case Report

A 60-year-old male patient with previous history of hypertension and diabetes was diagnosed with prostate cancer in 2011 was submitted to radical prostatectomy followed by hormonal therapy and adjuvant chemotherapy. He kept the follow-up with the urologist and oncologist, with the disease under control.

In January 2016, he presented a sudden right peripheral face palsy that was managed as Bell palsy. In March 2016, he underwent a skull imaging exam due to hearing loss and



**Fig. 1** Computed tomography scan of multislice contrasted skull (March 2016) - atrophy of the right mastoid, with signs of thrombosis of the sigmoid sinus (lower arrow).

auricular pain. The computed tomography (CT) scan revealed mastoid infiltration in the right side, and he was diagnosed with chronic mastoiditis and initiated antibiotic therapy.

The condition evolved during the antibiotic therapy with the patient presenting headaches of moderate intensity, dizziness, as well as some episodes of falls and small cranial traumas. Twenty days after the antibiotic therapy began, he developed vomiting and mental confusion. At this moment, he was admitted to our service for a neurological evaluation.

Upon admission, he presented a Glasgow Coma Scale (GCS) score of 14 (OR [Ocular Response], VR [Verbal Response], MR [Motor Response]), a right peripheral facial palsy (House-Brackmann 3), and a left incomplete hemiparesis grade 4+.

The patient underwent a CT scan that showed right fronto-parieto-occipital subdural hypodensity, slight meningeal enhancement, signs of mastoid atrophy, and thrombosis of the adjacent sigmoid sinus (► **Fig. 1**).

At that moment, we first thought about chronic subdural hematoma because of the history of falls and mild repetitive small cranial traumas or subdural empyema, because of the previous diagnosis of mastoiditis.

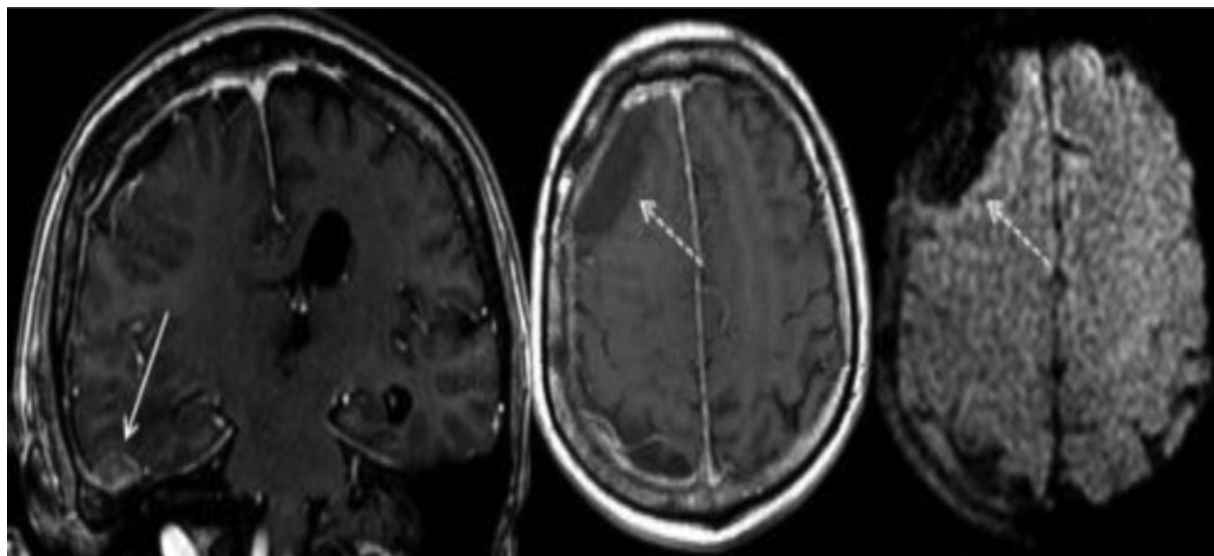
The patient underwent a magnetic resonance imaging (MRI) scan that confirmed the subdural collection but without restriction in the diffusion sequence, making the diagnosis of subdural empyema less probable (► **Fig. 2**).

Because of the dural enhancement, we chose to treat the subdural collection by a small craniotomy in April 2016. During the surgery, the subdural collection was yellowish in color, and the dura mater was infiltrated by friable neoplastic material of difficult hemostasis.

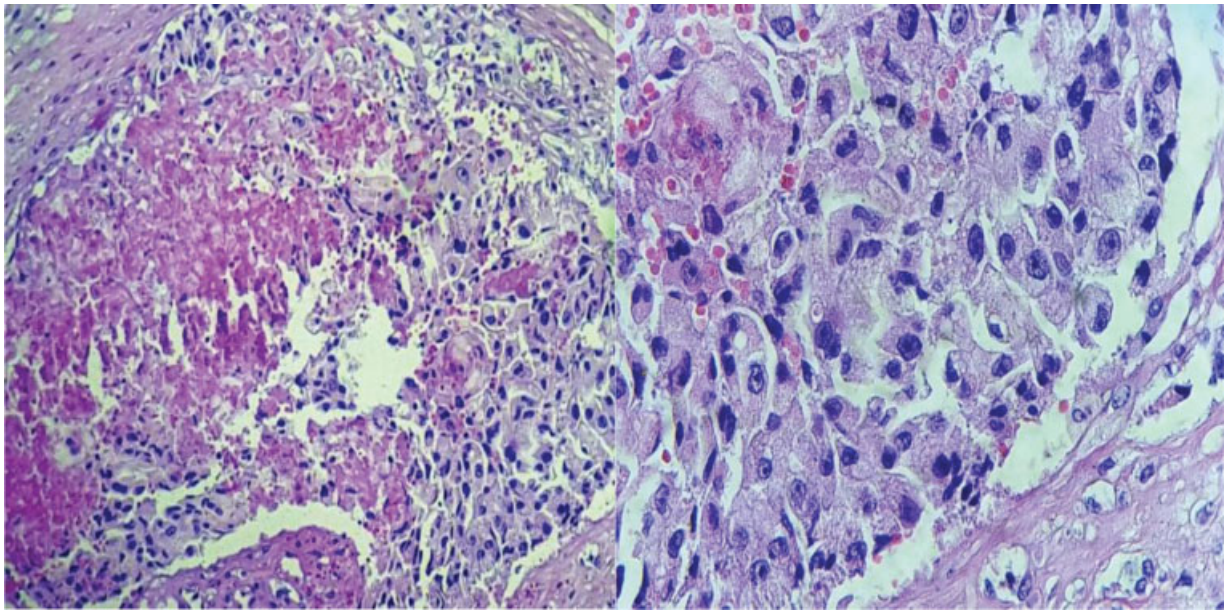
Drainage of the collection and incomplete resection of the dural lesion were performed. In the postoperative period, the patient evolved with improvement of the mental confusion and left motor deficit.

The histopathological analysis of the infiltrated meninges demonstrated atypical epithelial cells, suggesting an epithelioid carcinoma (► **Fig. 3**). The immunohistochemistry was positive for the prostate-specific antigen (PSA), cytokeratin AE1/AE3, epithelial membrane antigen (EMA) and androgen receptor antigens, being conclusive for meningeal carcinomatosis by a primary acinar prostate adenocarcinoma, Gleason grade 5. (► **Figs. 4 and 5**).

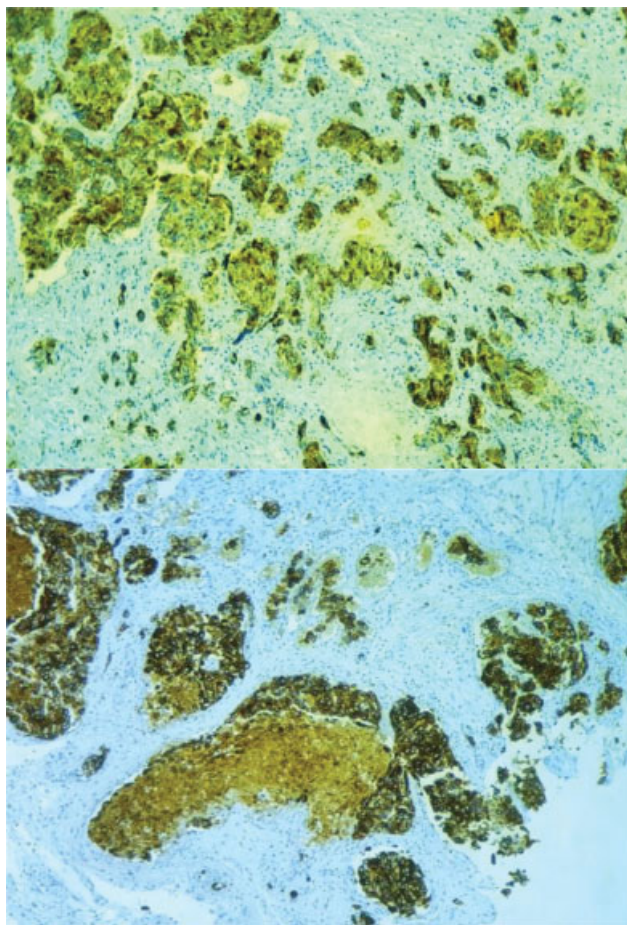
The involvement of the temporal bone, initially managed as mastoiditis, revealed a neoplastic infiltration of the adenocarcinoma.



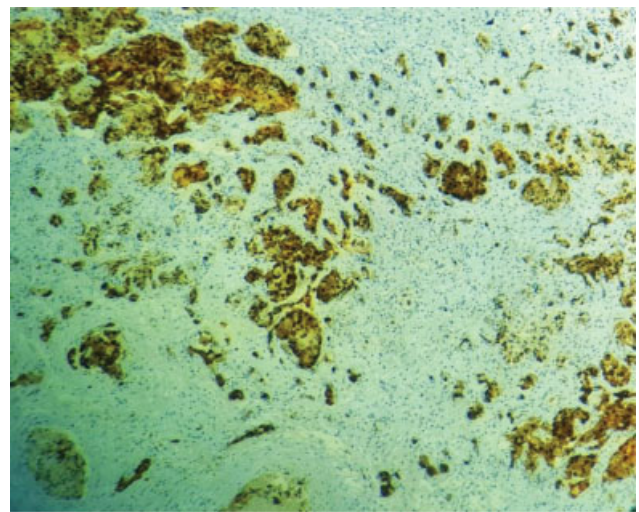
**Fig. 2** Magnetic resonance imaging scan of contrasted skull (April 2016) - weighted sequence in T1 in the coronal plane showing dural enhancement adjacent to the temporal bone. The T1 and diffusion-weighted imaging sequences in axial cuts show subdural collection without diffusion restriction.



**Fig. 3** 10x magnification: histological sections show extensive meningeal infiltration by malignant epithelial neoplasia with solid block layout and marked comedonecrosis. 40x magnification: cellular details with pleomorphic nuclei are observed.



**Fig. 4** Cytokeratin AE1/AE3, clone E1/AE3, strong and diffuse positivity in injured cells. Prostate-specific antigen (PSA) /clone 28a4, strong and diffuse positivity in injured cells.



**Fig. 5** Androgen receptor, clone AR441, strong and diffuse positivity in injured cells.

The patient was submitted to an Ommaya catheter for intrathecal chemotherapy. The procedure was uneventful. He was discharged at the end of May and died in July 2016 due to clinical complications.

### Discussion

The first case of non-traumatic subdural hematoma secondary to metastatic invasion was described by Westenhofer,<sup>5</sup> who reported a case of stomach carcinoma.<sup>5,6</sup> Meningeal carcinomatosis presenting as chronic subdural hematoma is present only in 0.02% of the autopsies performed in patients with suspicion of meningeal metastatic infiltration.<sup>3</sup>

**Table 1** Cases of prostate adenocarcinoma presenting as subdural collection described in the literature

Study	Age	Clinical findings	Aspect of the extra-axial collection on tomography	Preoperative skull resonance findings	Surgery	Surgical findings	Histopathological infiltrate	Outcome
Bucci and Farhat <sup>11</sup>	62	Headache and mental confusion; trauma: no	Isodense extraxial collection	Not performed	Craniotomy for subdural collection	Slim hematoma membrane	On the hematoma membrane	Death 4 days postoperatively
Bucci and Farhat <sup>11</sup>	63	Confusion and weakness in the limbs; trauma: no	Hypodense extraxial collection	Not performed	Craniotomy for subdural collection	Subdural hematoma with membrane	On the hematoma membrane	Not Reported
Cheng et al <sup>12</sup>	72	Headache and hemiparesis; trauma: no	Hypodense extraxial collection	Not performed	Hematoma surgery (not specified)	Dural invasion by yellow mass; without hematoma	On the dural membrane	Death 4 months postoperatively
Dols et al <sup>13</sup>	54	Headache and facial palsy; trauma: no	Isodense extraxial collection	Extense dural involvement	Not performed	-	-	Death after 3 days of hospitalization
Dorsi et al <sup>10</sup>	71	Headache; trauma: yes	Hypodense extraxial collection	Extense dural involvement	Craniotomy, tumoral resection and collection drainage	Dural nodular invasion associated with yellow subdural collection	On the dural membrane	Not reported
Dorsi et al <sup>10</sup>	72	Mental confusion; trauma: no	Hypodense extraxial collection	Nodular dural involvement	Trepanning and collection drainage	Hematoma	On the hematoma membrane	Death 7 days postoperatively
Meara et al <sup>14</sup>	62	Behavioral change; trauma: no	Hypodense and nodular extraxial collection	Not performed	Trepanning and collection drainage	Subdural hematoma and dural invasion	On the dural membrane	Death 4 days postoperatively
Patil et al <sup>15</sup>	71	Headache; trauma: yes	Isodense and hypodense collection	Not performed	Trepanning converted into craniotomy and tumoral biopsy	Diffuse Subdural Tumor in Plaque	In subdural tumor	Death 25 months postoperatively
Yu et al <sup>16</sup>	62	Convulsive crisis; trauma: no	Bilateral isodense extraxial collection	Difuse dural involvement with nodular areas	Not performed	-	-	Not reported
N'Dri Oka et al <sup>17</sup>	60	Headache, mental confusion, and hemiparesis; trauma: no	Hypodense and multilobular collection in crescent	Not performed	Craniotomy for acute subdural hematoma	Subdural yellowish tumor	On the subdural membrane	Not reported
Tomlin and Alleyne <sup>18</sup>	61	Headache and mental confusion; trauma: yes	Isodense extraxial collection	Not performed	Trepanning converted into craniotomy for tumoral biopsy	Subdural and difuse dural involvement	On the subdural and dural membranes	Death 3 months postoperatively
Nzoukou et al <sup>7</sup>	65	Mental confusion and weakness in the limbs; trauma: yes	Bilateral extraxial multinodular hyperdense collection	Not performed	Trepanning converted into craniotomy	Difuse dural involvement by yellowish tumor	In the subdural, dural and bone membranes	Death 5 months postoperatively
Present study	60	Headache, mental confusion, and hemiparesis; trauma: yes	Hypodense collection	Subdural collection, without diffusion restriction	Craniotomy for subdural collection	Subdural citrine collection and dura matter infiltrated by crumb cloth	Meningeal infiltration by epithelial cells.	Death 3 months postoperatively

The most common primary histological types involve prostate adenocarcinoma, followed by breast, lung and gastric adenocarcinomas.<sup>7,8</sup> The two most discussed mechanisms of neoplastic infiltration are the hematogenous pathway and retrograde drainage by the vertebral venous plexus.<sup>7</sup>

Clinically, these patients may progress with headache in 40% of the cases. Other possible symptoms are motor deficits, vomiting, changes in consciousness, and, more rarely, seizures.<sup>1</sup>

The complementary exams are key parts of the diagnostic search.<sup>9</sup> The MRI of the skull in diffusion-weighted imaging (DWI) was of great importance in the description of the case herein reported by reducing the possibility of empyema, since there was an initial suspicion that the patient was a carrier of chronic mastoiditis. In some cases, meningeal infiltration is evident in the preoperative period, which is extremely important for surgical planning.

There are few reported cases of prostatic adenocarcinomas mimicking clinical pictures of chronic subdural hematomas. As to the pathophysiology of this process, some authors consider it is secondary to obstruction of the intradural vein by the tumor, with increased pressure on the capillaries and extravasation of the blood into the subdural space.<sup>6</sup> More modern studies add other mechanisms such as rupture of the fragile neovascular microvasculature of the tumors, and hemorrhagic effusion of the lesions by angiodesmoplastic reaction.<sup>8</sup>

In a literature review,<sup>10</sup> cases of meningeal carcinomatosis due to prostate adenocarcinoma were found presenting or mimicking a chronic subdural hematoma. These cases are described in ►Table 1.<sup>7,10-18</sup>

Regarding these cases, when the surgical and histopathological findings were observed, six cases were defined as presenting only meningeal invasion, with no evidence of subdural collection.

With the inclusion of the case herein described, the mean age of presentation is 64 years,<sup>2</sup> with headache and mental confusion being the most reported clinical signs. History of trauma was present in 38.4% of the descriptions. The mean time between the diagnosis of the primary site and the discovery of meningeal carcinomatosis ranges from 3 months to 7 years, a fact that is compatible with the clinical case herein presented. The surgical techniques employed in the described cases varied from trepanation with lavage of the cavity with an isotonic solution to craniotomy.

The surgical approach is indicated for oncological diagnosis and when there is clinical symptomatology established by the mass effect of the collection. Care should be taken in the precise hemostasis of pachimeninges infiltrated by neoplastic cells due to the increased risk of hemorrhage in the dural space in the postoperative period.<sup>19</sup>

## Conclusion

Variable clinical presentations may occur in dural metastases; however, clinical and radiological presentations as chronic subdural hematoma are very rare. There are few descriptions of cases like this in the literature.

Due to the difficulty in performing surgery due to tissue friability, the operative procedures must be succinct, with drainage of the blood collection when present and biopsy of the pachimeninges for the diagnosis by histopathological and immunohistochemical studies to better determine the primary site of the neoplasia in these patients and for a therapeutic definition.

To support the diagnosis, the previous medical history is as important as the complementary exams and the pathology studies because the symptoms are common in the neurological emergency. To our knowledge, this is the first report of prostate cancer mimicking a chronic subdural hematoma in Brazil.

## Conflict of Interests

The authors have no conflict of interests to declare.

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