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## Cerebellar metastasis of gastrointestinal stromal tumor: A case report and review of the literature

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## ABSTRACT

**INTRODUCTION:** Intracranial metastases of gastro intestinal tumors are very rare. To the best of our knowledge only few cases were reported on the literature.

**CASE DESCRIPTION:** We describe the case of 66-year-old male that presented with headache and vomiting. Physical examination found a kinetic cerebellar syndrome. Brain CT scan and MRI showed a right cerebellar tumor. Sub-occipital craniotomy was performed and the tumor was completely resected. Surgical outcomes were marked by the occurrence of an abdominal pain two days after brain surgery. Peritonitis was diagnosed and the patient underwent surgery. Per-operatively, a hemorrhagic tumor perforating the intestines was found and resected. Pathologic examination of the cerebral tumor's resection piece and the intestinal resection piece concluded to a metastasis of a stromal gastro-intestinal tumor.

**DISCUSSION:** Gastro-intestinal stromal tumors are frequent neoplasms, but intracranial metastases of these neoplasms are extremely rare. Abdominal symptomatology frequently reveals the pathology. However, extra digestive symptoms may in rare cases disclose intestinal tumors. Intracranial metastases of gastro-intestinal stromal tumors are generally solitary mainly supratentorial. Infratentorial metastases are very uncommon. Management of gastro-intestinal stromal tumors is based on surgical removal of the tumor. Adjuvant treatment consisting on chemotherapy and radiotherapy is subject of debate.

**CONCLUSIONS:** Gastro-intestinal stromal tumors are frequent neoplasms with a high metastasizing potential on liver and peritoneum. Brain metastases are extremely rare and the prognosis is worse when they are present. Surgery remains the main treatment for the primitive and the secondary lesions.

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## 1. Background

Intracranial metastases are extremely rare lesions of gastro intestinal stromal tumors (GIST). Few cases were reported in the English literature [1,2]. GIST Metastases usually occur on the liver and the peritoneum [3,4].

These secondary lesions frequently occur months after the intestinal neoplasm discovery. To our knowledge, only three cases in literature were described in which a gastro intestinal neoplasm was discovered following neurologic symptoms of an intracranial metastasis [5].

We report a case of stromal gastro-intestinal tumor discovered by a cerebellar metastasis.

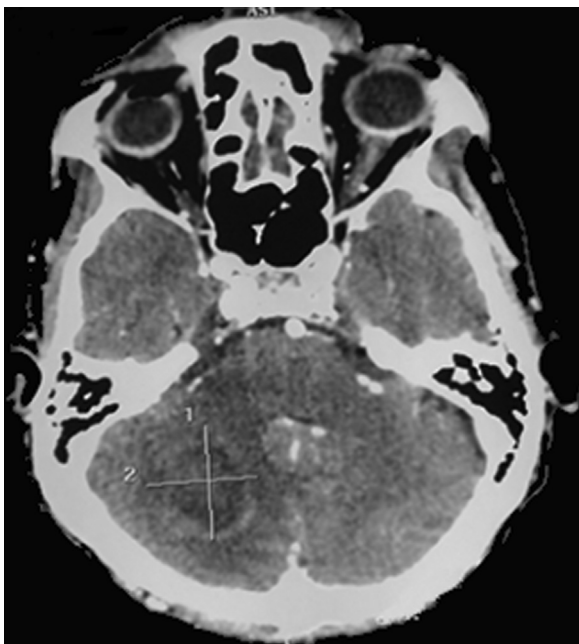
This work has been reported in line with the SCARE criteria [6].

## 2. Case study

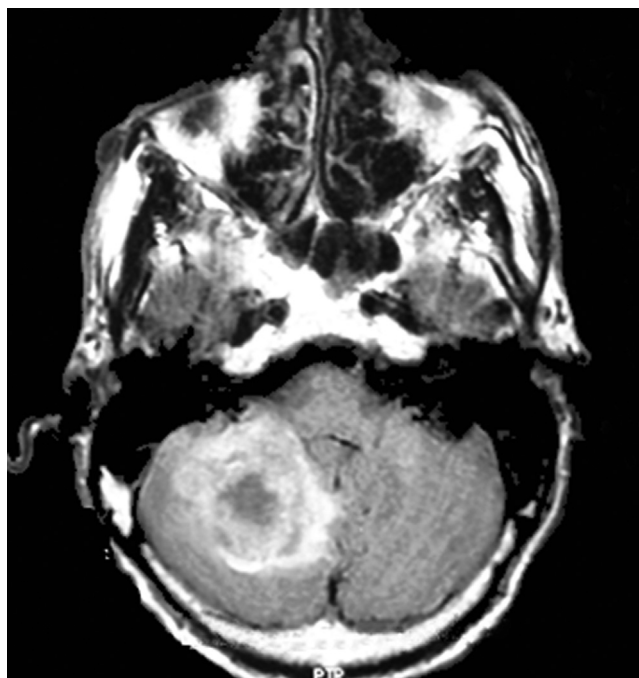
A 66-year-old male patient presented with headache and vomiting, progressively worsening since a month. Physical examination found a right kinetic cerebellar syndrome with a right hypermetria on the finger to nose test. Brain CT scan showed a 4 cm diameter heterogeneous well circumscribed right cerebellar lesion with a peripheral enhancement after contrast injection. The lesion and the surrounding edema exerted an important mass effect on the fourth ventricle (Fig. 1), but no hydrocephalus was associated. On MRI (Figs. 2 and 3), a heterogeneous lesion on T1 and T2 MRI weighted sequences with cystic and solid components was found. The solid part was enhanced after injection of Gadolinium. Decision was to operate the patient. A sub occipital craniotomy was performed and a well cleavable, hemorrhagic mass was totally resected. Surgical outcomes were marked by the occurrence of an abdominal pain and vomiting two days after brain surgery. Abdominal defense was found on physical examination. Peritonitis was diagnosed and the patient underwent surgery, a tumor perforating the intestines was found and completely resected (Fig. 4). Histological examination (Figs. 5 and 6) of the cerebral tumor's resection piece concluded to a metastasis of a grelic neoplasm. Diagnosis of gastro-intestinal stromal tumor was pathologically confirmed after examination of

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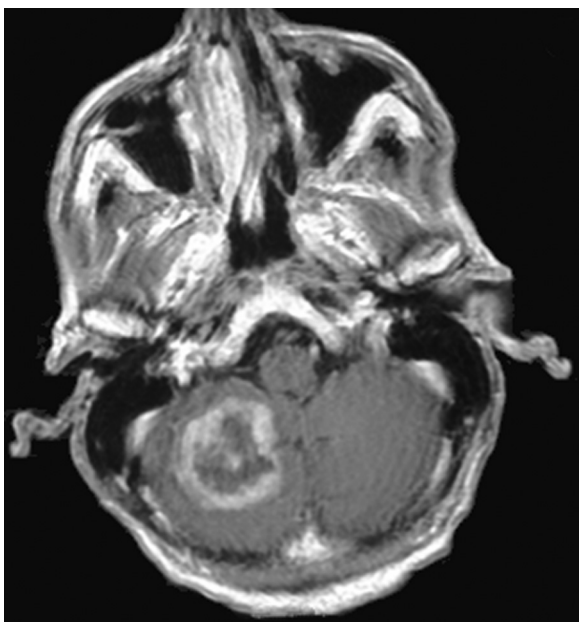
E-mail addresses: [badri.med@gmail.com](mailto:badri.med@gmail.com) (M. Badri), [chabaane.mohamed@gmail.com](mailto:chabaane.mohamed@gmail.com) (M. Chabaane), [gastghagad@yahoo.fr](mailto:gastghagad@yahoo.fr) (G. Gader), [kamelbahri@yahoo.com](mailto:kamelbahri@yahoo.com) (K. Bahri), [ihsenzammel@gmail.com](mailto:ihsenzammel@gmail.com) (I. Zammel).



**Fig. 1.** Axial brain CT scan with contrast injection showing a well circumscribed right cerebellar lesion with peripheral enhancement.



**Fig. 3.** Axial T2 Flair weighted MRI sequence showing a right cerebellar mass with perilesional edema.



**Fig. 2.** Axial T1 weighted brain MRI sequence after Gadolinium injection showing a 4 cm diameter right cerebellar lesion with peripheral enhancement.

grecic specimen. An extension assessment was performed to look for other tumor localization. But aside from cerebellar metastases, no other lesions were found. Radiotherapy and chemotherapy have been carried out as adjuvant treatment. After 12 months of clinical follow up, the patient has not yet shown signs of recurrence of the tumor.

### 3. Discussion

GISTs are frequent neoplasms occurring generally on patients around 60 years old [7]. Intracranial metastases of these gastrointestinal neoplasms are extremely rare [1,2].

Abdominal symptomatology frequently reveals the pathology [8]. However, extra digestive symptoms such as neurologic deficit



**Fig. 4.** Peri operative image showing a 5 cm necrotic oval shaped tumor in the small bowel.

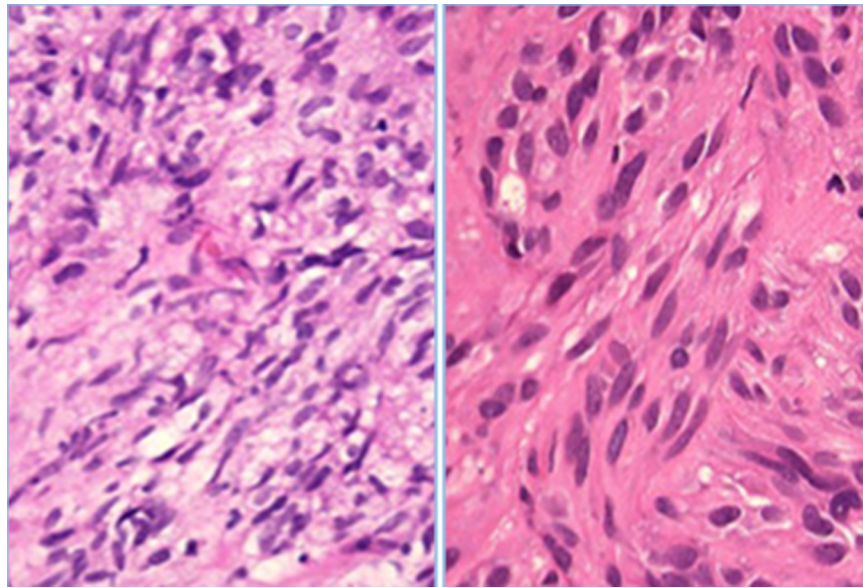
or signs of intracranial hypertension [5,9] rarely disclose intestinal tumors. To our knowledge, only three cases in literature were described in which a gastro intestinal neoplasm was discovered following neurologic symptoms of an intracranial metastasis

Radiologically, intracranial metastases of GIST are generally solitary, larger than 3 cm and supratentorial [9]. Infratentorial metastases are very uncommon. Only four cases of GIST infratentorial brain metastases have been reported [1,2,5,9].

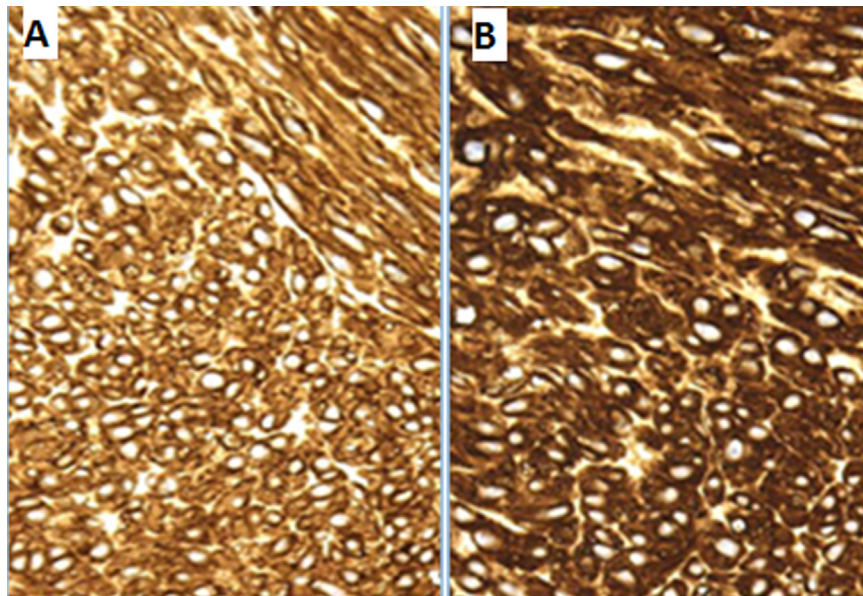
Management of GIST is based on surgical removal of the tumor whether distant metastases were detected or not. According to recent studies, targeted chemotherapy with Imatinib after molecular featuring of the tumor tends to be effective on the GIST [9]. However, it doesn't seem to have any efficiency on brain metastases, as these drugs do not come through the blood-brain-barrier. Radiotherapy remains the gold standard on adjuvant treatment of the metastatic brain lesions [10].

Our patient underwent surgery with a complete resection of the cerebellar tumor and the intestinal tumor. Adjuvant treatment





**Fig. 5.** Pathologic examination showing an epithelioid neoplasm that was composed of uniform small cells with moderate cellularity and storiform architecture (hematoxylin and eosin stain).



**Fig. 6.** Immunohistochemistry shows that the tumor cells were immune-positive for c-kit (Fig. 6a) and CD34 (Fig. 6b).

consisted on whole brain radiotherapy for cerebellar metastasis, and chemotherapy as a general treatment.

This article shares the common limitations of case reports: the inability to generate epidemiological informations and to conclude to cause-effect relationships requiring planned studies including control groups. Thus, it is impossible that findings from case reports can be generalized. In order to generalize we need both a cause-effect relationship and a representative population for which the findings are valid. We hope in the future to look for new cases, to collaborate with other centers in order to share their experience, on the aim to work on a larger series giving the possibility to deliver well established epidemiological, clinical and therapeutic results.

#### 4. Conclusion

GISTs are frequent neoplasms with a high metastasizing potential on liver and peritoneum. Brain metastases are extremely rare

and the prognosis is worse when they are present. Surgery remains the main treatment for the primitive and the secondary lesions. Researches on targeted adjuvant therapy following molecular analysis of the tumor seem to have encouraging results for the tumor control.

#### Conflicts of interest

The authors do not declare any conflicts of interest.

#### Funding source

No sources of funding are to be declared.

#### Ethical approval

Ethical approval is not required by our institution.

**Consent**

For this article we have a patient consent.

**Author contribution**

Mohamed Badri, Mohamed Chabaane and Ghassen Gader wrote the manuscript;

Kamel Bahri did the bibliographic search.

Ihsèn Zammel corrected the manuscript.

**Guarantor**

Mohamed Badri and Ghassen Gader accept full responsibility for the work.

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