CASE REPORT

Post-traumatic acute-on-chronic subdural haematoma: an unusual presentation of skull metastasis from prostate carcinoma

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SUMMARY

The authors report on a case of an 80-year-old man operated on urgently for evacuation of an acute-on-chronic subdural haematoma after a minor blunt head trauma that had occurred the day before. The haematoma was revealed by a plain CT scan on arrival at the accident and emergency department. During operation, the calvarial bone and dura mater were found to be of pathological aspect and histology subsequently confirmed metastatic involvement from a known primary prostate cancer (PC). After an initial successful technical and clinical result, the patient worsened again due to a rebleed and succumbed soon after. The awareness of the possibility of osteodural metastatic involvement could have led to the adjunct of a contrast-enhanced CT study and altered the treatment strategy.

BACKGROUND

This case should raise the awareness of the possibility that a cranial osteodural metastasis could be a contributing factor in the formation of a post-traumatic subdural haematoma.

The identification of such an occurrence before surgery not only avoids having to deal with unexpected conditions during the procedure but also has a relevant potential in altering treatment strategy up to the possibility of avoiding an unnecessary or heroic procedure altogether with its obvious negative repercussions on the patient, family and the healthcare system.

CASE PRESENTATION

An 80-year-old man was brought to the accident and emergency (A&E) department after having been found minimally conscious in bed in the morning. The evening before, he had undergone a blunt head trauma at home with no particular immediate neurological consequences. He was in long-term follow-up for metastatic prostate cancer (PC) and recovering from a recent femur fracture but was globally independent. He was being treated with fondaparinux after the orthopaedic procedure.

On arrival at A&E, he had a Glasgow Coma Score of 7/15 with a left-sided blown pupil. He was intubated and underwent a plain head CT scan (figure 1a) showing a hemispheric acute-on-chronic subdural haematoma with mass effect and transtentorial descending herniation.

After a brief history was taken with his relatives, information was provided about rationale, benefits and risks of a surgical evacuation procedure. The decision was taken to perform a burr hole evacuation as drainage of the predominant hypodense fluid component was deemed appropriate to yield the necessary decompression. The family gave consent for the surgery and the patient was taken to the Operation Room (OR) immediately.

By the time he reached the OR, the pupils had changed to sluggishly light-responsive bilateral mydriasis. A right parietal incision was made, revealing a macroscopic osseous alteration (figure 2c). Burr hole evacuation was performed and bone fragments were sent as pathological specimens. The underlying dura mater appeared extremely thinned, bleeding, colour altered and discontinued. After careful coagulation, a drain was inserted and left in place after several rounds of saline irrigation up to the return of clear fluid with no active bleeding. At the end of the procedure, the pupils were isocoric, miotic and normally reactive to light. The patient was taken to the high dependency unit (HDU) for postoperative monitoring.

INVESTIGATIONS

A plain CT scan of the head was made.

DIFFERENTIAL DIAGNOSIS

Considering the history and the nature of the CT scan finding the diagnosis of post-traumatic subdural haematoma appeared to be the only appropriate one.

TREATMENT

The patient was surgically treated with a burr-hole drainage of the haematoma.

OUTCOME AND FOLLOW-UP

In the HDU, vitals and pupils were stable for 4 hours after which the patient became mydriatic again and a new CT scan showed a rebleed (figure 1b). No further surgical indication was given. Unfortunately, the patient succumbed less than 24 hours later.

Subsequent communication with the oncology team from the hospital where the patient was followed up for his PC revealed that he had undergone a bone scintigraphy 7 months prior to the present event, which had already shown diffuse skeletal dissemination, including tracer uptake in

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Figure 1 CT scan of the head. At admission in accident and emergency department, (a) non-contrast brain and bone-windowed axial images show a left-sided acute-on-chronic intracranial subdural haematoma with mass effect. After clinical worsening 5 hours postoperatively, (b) non-contrast brain and bone-windowed axial images show a reformation and increase of the acute component of the haematoma and its mass effect. White arrow indicates the burr hole for drainage and the site for biopsy. Black arrow indicates the drainage catheter.

Figure 2 (a) Bone scintigraphy performed 7 months before admission in accident and emergency department. Note diffuse bone dissemination including tracer uptake in the cranial vault. (b) Bone-windowed axial CT image of the head revealing a high density bony alteration of the skull (asterisk). (c) Intraoperative photograph showing the macroscopic osseous alteration that was sampled. Histopathology resulted positive for metastatic localisation of pancreatic adenocarcinoma. (d) H&E stain at 200× magnification showing pancreatic adenocarcinomatous cells nestled in the calvarial bone.

the calvarial bone (figure 2a). Histology of the intraoperative sample confirmed PC (figure 2d).

DISCUSSION

Intracranial involvement from PC is an uncommon event (1%–6% of autopsy series of long-term follow-up patients). Dural metastasis of PC are even more rare, arising in only 0.45% of cases as extrapolated in the MD Anderson Cancer Centre review.¹ Specific sites of cranial PC localisation are furthermore the orbit and the sphenoid wing^{2,3} with a wide pattern of clinical presentation.

In 2011, a review was performed by Guedes *et al*⁴ about radiological trademarks of dural prostate metastases (DPM), in particular about MRI sensitivity for atypical DPM pattern. The authors added six cases more to the total of 21 cases they had reviewed from 17 series already published, obtaining a wider clinical and radiological picture from 27 patients with osseous and dural involvement. Presentation greatly varied, mimicking meningiomas and leptomeningeal carcinomatosis with varying degrees of cranial nerve deficits. Interestingly, none of the cases they reviewed presented with a subdural haemorrhage, but they offered a valuable overview on the other atypical cranial presentations of PC.

In 2012, Wong-Li Yu *et al*⁵ reported a case of DPM mimicking acute subdural haematoma. In that case, radiological features were more atypical and the patient's stable clinical conditions allowed for time for a full workup (contrast-enhanced CT, then gadolinium-enhanced MRI) and communication with the oncology team following the patient, which also in this case revealed a bone scintigraphy performed several months prior already showing metastatic involvement of the skull vault. The patient was therefore treated conservatively. The authors reviewed the literature for similar cases^{6,7} where, like in our report, suspicion was raised only during surgery. The same was the case in an additional report by Patil *et al*, where the conclusion was made that the suspicion of a DPM could have led to a preoperative MRI scan and thus altered the treatment course.⁸

In a global context in which the older male population continues to grow and age, PC has become the fifth leading cancer death cause. Considering this, together with the fact that metastases of the central nervous system are considered a terminal event with a median survival of 3.5 months in patients where radical surgery is not feasible,¹ one has to bear in mind even an occurrence as rare, but increasingly less so, as DPM.

Our patient's family was aware of metastatic bone lesions but unaware of the skull localisations. The patient had been treated and followed up for his PC in another hospital, so previous imaging studies could only be reviewed a posteriori. In particular, Positron Emission Tomography (PET) scan images showed multiple areas of intense radiotracer uptakes with the skull appearing to be widely affected as well (figure 2a). With this in mind, careful re-examination of the bone-windowed axial CT scan showed a hyperdense thickening of the cranial vault (figure 2b).

Had we known this earlier, a completely different discussion with the family could have been made about rationale, realistic expectations and risks and benefits of the operation. Appropriate knowledge of the full underlying condition and its ramifications as reported in similar cases in the literature might have oriented us to abstain from surgery altogether.

As neurosurgeons, we commonly assess elderly patients with an intracranial bleed and suspicion of underlying disease arises generally mainly in some intraparenchymal haemorrhages. It

is not commonly thought of in subdural haematomas. Furthermore, as a contrast-enhanced head CT scan is not routinely performed in A&E, it is unlikely, as in our case, to think of an underlying neoplastic condition in what on a plain CT scan appears just like a standard post traumatic acute-on-chronic subdural haematoma. This makes the most important message we want to convey with this case: 'Think about it'.

With our report we want to flag up the possibility and raise the suspicion of non-parenchymal metastatic cranial involvement in oncological patients with subdural haematoma.

Learning points

- ▶ Metastatic involvement of the dura and calvarial bone contributing to a subdural haematoma is an unusual but not too rare occurrence.
- ▶ A subdural haematoma with an acute component after a recent minor blunt head trauma in a patient with a known primary cancer should raise the suspicion of osteodural metastasis.
- ▶ In the face of such a suspicion, a contrast-enhanced CT scan is a minor adjunct to the standard protocol with a potentially major repercussion on the treatment plan and prognostic projections.

Contributors All authors meet the ICMJE criteria for authorship. In particular, LL was predominantly involved in conception and design as well as drafting of the work. AC added radiological data and pertaining explanation as well as integration of it into the work. FC predominantly added and revised information pertaining to prostate cancer and revised, corrected and generated the final form of the work.

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