Learning from errors

Chronic subdural haematoma management: an iatrogenic complication. Case report and literature review

Pavlov Vladislav, George Bernard, Salvatore Chibbaro

Neurosurgery Department, Lariboisiere University Hospital, Paris, France

Correspondence to Ms Salvatore Chibbaro, schibbaro@hotmail.com

Summary

The authors report the case of a 45-year-old woman who presented to our institution with 10 days history of confusion and signs of progressive raised intracranial pressure as a result of a minor head injury occurred 4 weeks before. A brain CT-scan showed a large right hemispheric chronic subdural haematoma which was, as routinely, treated by burr-hole craniostomy and closed-drainage. Although the procedure was uneventful, the next day the patient developed a mild left hemiparesis associated to a slight global status worsening. A brain CT scan showed an intracerebral position of the drain with diffuse brain oedema and midline shift. Following drain removal the patient developed a serious neurological deterioration dropping the Glasgow coma scale to 8/15 as the result of an intracerebral and intraventricular haemorrhage along the removed drain trajectory. The clinical features of this iatrogenic complication are reported analysing also globally chronic subdural haematoma management and discussing pertinent literature.

BACKGROUND

Evacuation of chronic subdural haematoma (CSDH) represents one of the most frequently performed neurosurgical procedure. Surgery is usually realised by twist-drill craniostomy and spontaneous haematoma evacuation^{1 2} and/or catheter drainage,^{3–5} larger craniotomy evacuation and membranectomy,^{6–9} and burr-hole craniostomy with or without continuous closed drainage.^{10–19} The optimal surgical management is still a matter of debate. The complications related to CSDH treatment may be divided in surgical and medical related (peri- and postoperative). The most common surgical complications are seizures, subdural empyema, intracerebral haemorrhage, epidural haematoma, pneumocephalus, intracerebral abscess.²⁰ Haematoma recurrence and/or incomplete evacuation with persisting or recurrent symptoms needed repeated surgery or craniotomy were observed in 31.6% of patient

by Rohde *et al.*²⁰ A recurrence rate of approximately 10% has been reported in another study.²¹ Other complications such as, meningitis,²² polymicrobial skull osteomyelitis,²³ cerebral aspergillosis,²⁴ cerebellar haemorrhage,²³ acute carotid arterial occlusion,²⁴ brain stem haemorrhage²⁵ combination of epidural and intracerebral haematoma²⁶ have also been described. Overall mortality after surgical treatment of CSDH has been reported to be 0–8%.²⁷ At our institution, burr-hole craniostomy and closed drainage (BCD) is the operative technique of choice. In the present paper, the authors describe an iatrogenic and life-threatening complication of CSDH management with its clinical features reviewing also pertinent literature.

CASE PRESENTATION

We report the case of a 45-years old woman presenting to our institution as an emergency with 10 days history of



Figure 1 Preoperative axial CT scan showing a right chronic subdural collection.

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progressive headache, episodic mental confusion with disorientation in time and space (grade II according to Bender grading).²⁸ The patient suffered a minor head injury 3 weeks prior admission.

An urgent brain CT scan (figure 1) showed a large right subdural hyperdense collection with sign of recent bleeding causing a midline shift of 10 mm. At this stage, after completing all the preoperative screening, surgery was proposed to the patient who gave formal consent. Surgery was performed under local anaesthesia with the patient in supine position and the head turned contralaterally.

A right parietal burr-hole was preformed using an air power drill which was enlarged by kerrison rongeur. Dura was opened in a cruciate fashion; the parietal haematoma membrane was identified and once incised the haematoma was evacuated (coming out under high pressure). A jackson-pratt type drain was inserted in the subdural



Figure 2 Postoperative axial CT scan showing the intracerabral catheter trajectory going from right parietal area to controlateral temporal area through the callosal body.

cavity and connected to a closed reservoir. The skin was finally closed in anatomical layers and the drain fixed to the skin. The procedure was uneventful and in the immediate postoperative stage the patient was conscious; cooperative without any motor or sensory deficits. The next morning the patient started to be very confused and drowsy, droping the GCS to 12/15 with a slight left hemiparisis. Immediately a brain CT (figures 2 and 3) and angio CT scan (figure 4a, b) was performed showing a deep intracerabral position of the drain with diffuse hemispheric oedema and important midline shift.

Nevertheless, the drain was removed followed by further progressive neurological deterioration down to a Glasgow coma scale of 8/15. An emergent brain CT scan reveals an intraparenchymal haematoma along the removed drain trajectory (figure 5a,b). The patient was thus transferred to the intensive care unit (ICU), where



Figure 3 Postoperative coronal CT scan showing the intracerabral catheter trajectory and its relationship with brain structures.



Figure 4 a) Axial and b) coronal angio CT scan showing the deep intracerabral position of the drain and its relation/contiguity to brain vessels.

she was deeply sedated, intubated and ventilated; intracranial pressure (ICP) was monitored showing a mean value of 20 mm Hg with a good brain circulatory profile demonstrated by transcranial Doppler. The patient was managed conservatively during 7 days in the ICU during which she first developed epilepsy and any attempt of weaning sedation resulted in raised ICP up to 35 mm Hg. Two repeated check CT scan showed diffused brain oedema as well as the evolution towards resorption of the haematoma. After a week the sedation could be weaned off with a mean of ICP value of 12-15 mm Hg and the patient waking up progressively and extubated at day 8 showing a residual hemipareis more important on the left upper limb. The patient received a course of physical therapy and promptly improved her left-sided motor deficit within 10 days being able to return at home. Physical therapy was carried out for 4 weeks with complete recovery. At 2 months follow-up the patient was neurologically intact reporting a generalised well being and a check brain CT scan revealed a complete resorbtion of the known haematoma (figure ба,b).

DISCUSSION

Spontaneous resolution of the CSDH has been described sporadically,²⁸ ²⁹ most of the CSDH require surgical management. Studies have shown that medical therapy of CSDH is inferior to surgical evacuation and therefore it was abandoned in patients with symptoms with space-occupying lesions.³⁰ In the pre-CT era, craniotomy or craniectomy, often with membranectomy, was predominantly used until the 80s, when CT scanning became available allowing a closer radiological follow-up of the patients, leaving place to less invasive techniques such as burr-hole and twist-drill trephination with and without closed-system drainage.^{1–5} ^{10–19} The former techniques significantly lowered the mortality and morbidity rates of such disease, although the optimal surgical management is still a matter of debate and medical and surgical complications still remain a real management problem.

Regarding surgical management of CSDH the authors have performed an internal audit (unpublished data) on 800 CSDH managed during 20 years (from January 1991 to December 2010) analysing the operative technique as



Figure 5 a) Axial and b) coronal CT scan showing the intraparenchymal and intraventricular haematoma following the drain removal.



Figure 6 a) Coronal and b) axial check CT scan at 3-month follow-up showing a complete resorbtion of the haematoma.

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follow: twist-drill single versus double, extended burr hole, trephine craniotomy and/or larger craniotomy with membranectomy, which has shown pretty similar outcome results except for the larger craniotomy technique having an higher morbidity rate; furthermore the type of drainage was analysed as follow: open subdural drain versus closed system, subgaleal, or no drain at all; complete evacuation, recurrence and pneumoencephalus rate were similar except for the use of the closed subdural system drainage showing a higher complete evacuation rate with a lower recurrence and pneumoencephalus rate.

Rapid decompression of the haematoma results in focal cortical hyperaemia, which is believed to be the cause of intracerebral haemorrhagic complications in combination with cofactors such as labile hypertension and cerebral amyloid angiopathy.^{27 31 32} In the present paper, the intracerebral complication was iatrogenic by a traumatic placement of the subdural drain. This very rare complication we do think could be avoided by a careful placement of the subdural drain under visual control and by further irrigation of the subdural compartment to verify if any bridging or cortical vessel has been injured or as in our case if the drain even penetrated into brain parenchyma. Furthermore for this purpose an important feature would be the correct fixation of the drain to the skin as also a mobile drain may easily come out or inadvertently migrate further deeply inside. The authors are aware that this complication has already probably happened elsewhere but never reported. We also do believe that the present case may constitute an important and unique report and demonstration of a dangerous complication in treating a frequent disease which could be a very useful example for trainees.

Learning points

- CSDH represents one of the most frequent neurosurgical diseases and upto date its best management remains still controversial. Many complications may occur in treating such pathology; their knowledge could essentially contribute to improve the daily standard level of care and outcome results.
- To avoid such complication: a subdural drain should carefully placed as much as possible under visual control with the aid of a rigid curved instrument to hold it against dura, during the drain introduction the subdural compartment should be abundantly irrigated to verify if any bridging or cortical vessel has been injured or as in the present case if the drain has even penetrated the brain parenchyma and finally an important feature is the drain correct fixation to the skin as a mobile drain may easily come out or inadvertently migrate further deeply inside.

Competing interests None.

Patient consent Obtained.

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