Learning from errors

Postoperative subdural haematoma and pneumocephalus mimicking TIA

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Summary

An 86-year-old man presented with left hand numbness and weakness 10 days after a resection of squamous cell carcinoma of the right side of the scalp. A CT head scan identified a right-sided, hypodense subdural collection without midline shift, with associated pneumocephalus. When the images were reviewed on bony settings, minute drill holes were identified penetrating the outer tables as expected, but also the inner table of the calvarium. With this knowledge, the initial clinical diagnosis altered significantly from that of a transient ischaemic attack to a working diagnosis of a subdural haematoma as a complication of the penetrating injury to the cranium, in a patient with an elevated international normalised ratio.

BACKGROUND

Reconstruction of the scalp following oncologic resection is complex with the need for tumour resection and reconstructive surgery tailored to the clinical prognosis, treatment plan, and the patients' comorbidities along with aesthetic considerations. Recent papers have sought to provide evidence-based algorithms for treatment.^{1 2}

The aim of this case is to highlight a serious complication of drilling of the outer table of the calvarium.

CASE PRESENTATION

An 86-year-old gentleman presented to the accident and emergency department (A&E) with left hand numbness 10 days after resection of a 2 cm moderately differentiated squamous cell carcinoma of the right scalp and reconstruction with a full thickness skin graft.

Clinical examination at the time of admission revealed him to be not feverish and haemodynamically stable. The patient was well in himself and examination was normal except for minimally reduced power of the left hand with poor grip.

Three days earlier similar symptoms had precipitated a presentation to the A&E department. As these symptoms had lasted less than 1 h, the working diagnosis of a transient ischaemic attack (TIA) was made by the admitting A&E clinician. An urgent appointment in the TIA clinic with a plan for an outpatient CT head was arranged. No imaging was performed at this time.

The patient's medical history included a stroke and atrial fibrillation, for which he took warfarin.

INVESTIGATIONS

The preoperative anticoagulation plan had involved discontinuation of warfarin therapy 3 days prior to surgery. The patient's international normalised ratio (INR) on the day prior to surgery had been 2.9, dropping to 1.9 on the

day of surgery. The day following surgery, the INR measured at 1.9 and warfarin therapy was restarted at its normal dose.

Bloods taken on this admission showed the patient to have an elevated INR (3.1) but a normal white cell count.

As no previous imaging had been performed, an uncontrasted CT head demonstrated a right-sided hypodense extra-axial, subdural collection with associated pneumocephalus. There was no midline shift (figure 1). A contrast examination was performed which showed no enhancement of the collection. When the images were reviewed on bony settings, the drill holes were identified and shown to penetrate both the outer and inner tables of the calvarium (figure 2).

DIFFERENTIAL DIAGNOSIS

Prior to imaging the main differential was a TIA. Given the pneumocephalus, a subdural empyema was then considered, but with the discovery of drill holes penetrating through the calvarium, the differential diagnosis altered to include a subdural haematoma. As the patient was clinically well, not feverish, with a normal white cell count and lack of enhancement of the subdural collection, a subdural empyema was a less likely diagnosis. The elevated INR increased the likelihood of a diagnosis of subdural haematoma.

TREATMENT

The patient was admitted for observation, intravenous antibiotics and regular review of the scalp wound. Warfarin treatment was omitted for 16 days.

OUTCOME AND FOLLOW-UP

The patient suffered no further adverse effects and was discharged 9 days after admission. Clinical review at 2 weeks and 3 months did not reveal any further complications.

Figure 1 Right-sided hypodense, extra-axial subdural collection with associated pneumocephalus. There is no midline shift.

DISCUSSION

On presentation, prior to any imaging, a provisional clinical diagnosis of cerebrovascular attack TIA (CVA/TIA) was made. Despite the history of recent surgery, no link was considered, as the surgery for the skin cancer was thought, by the admitting team, to only involve excision and a skin graft. When the imaging identified a subdural collection with pneumocephalus, demonstration of the vault penetration was necessary to convince the clinicians that the subdural haematoma was a complication of the surgery.

This 86-year-old gentleman had several comorbidities with a high risk, moderately differentiated, squamous cell carcinoma over 2 cm in size and involving all five layers of the scalp. Although postoperative pathology confirmed that there were wide lateral margins free of tumour, tumour was confirmed to within 1 mm of the deep margin (reaffirming the need for periosteal excision), but the periosteum itself was free.

It is a dilemma for any reconstructive surgeon to place tissue directly onto cortical bone, especially when limited, as in this case, by the patient comorbidities. Full thickness

skin grafts, which contain epidermis and full thickness dermis, have four known phases to healing namely: adhesion, plasma imbibition, neovascularisation and maturation.³ With no periosteum, the adhesion and plasma imbibition is difficult and is often associated with unstable skin and wound break down.⁴ An attempt was made to allow granulation tissue to feed the graft by making minute drill holes, which were intended to penetrate the outer cortex into cancellous bone, leaving the inner table intact. Unfortunately in this gentleman, the drill holes penetrated the full thickness of the skull. Recent journals have not advocated the technique of stimulating granulation tissue by removing the outer table of the skull because of an unacceptable relation of risks and benefits.¹ Delayed grafting after a period of wound packing is reported to have improved results.⁵

Although our patient required no intervention for his subdural haematoma and pneumocephalus as a complication of vault penetration, other cases have been described where patients required admission to intensive care with bilateral pneumocephalus, cerebrospinal fluid leak, global respiratory failure and hemiparesis.¹

Figure 2 Minute drill holes (arrow) were identified and shown to penetrate both the outer and inner tables of the calvarium with pneumocephalus directly beneath.

Learning points

- ▶ Treatment of skin carcinomas of the scalp is less complicated when they do not involve the periosteum.
- ▶ Encouraging granulation beneath a skin graft by performing minute drill holes in the outer cortex, especially in a patient on warfarin, should be avoided.
- ▶ When forming a differential diagnosis of a cerebral event, recent surgery, however, seemingly inconsequential, should be considered with any associated complications.

Competing interests None.

Patient consent Obtained.

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