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CASE REPORT

Cortical membranectomy in chronic subdural hematoma: Report of two cases

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ABSTRACT

Different surgical procedures have been used in the management of chronic subdural hematoma (CSDH). Nowadays treatment with burr hole is more preferable than craniotomy in most clinics. We present two cases of CSDH, which caused neurological deficits. In both cases cortical membranectomy was performed following craniotomy. After this procedure, significant improvement was observed in patients neurological deficits. We recommend that craniotomy and subtotal membranectomy may be a more adequate choice in such cases. This report underlined that craniotomy is still an acceptable, safe, efficient and even a better procedure in selected patients with CSDH.

Key words: Chronic subdural hematoma, cortical membranectomy, neurological deficit

Introduction

Chronic subdural hematoma (CSDH) is formed gradually by the hemorrhage from parasagittal veins following a head trauma. Because the hemorrhage is associated with the injury of parasagittal veins, fibroblasts cover the internal surface of duramater. Parietal and visceral membrane occur between 7 and 21 days, respectively.[1] In complicated cases such as patients with chronic alcoholism, epilepsy, hematological disorders, cerebral atrophy and under anticoagulant therapy, a minor head trauma may cause CSDH.[2]

The major symptoms of CSDH are headache, unconsciousness, confusion and neurological deficits (contralateral motor deficits). It may also present with mild symptoms mimicking dementia such as disorientation several weeks after a minor traumatic injury. One of the most popular surgical treatment of CSDH; is burr-hole drainage. In this procedure; after drainage of hematoma, even if intracranial pressure becomes normal there can be residual hematoma in subdural layer.[3] In the literature; it is reported that in 12–22% of residual hematoma cases re-operation is required.[2] Subtotal cortical membranectomy via craniotomy is an excellent surgical procedure, which ensures rapid improvement in neurological deficits and has minimal risk of residual hematoma and cerebral herniation.[4]

Herein, we present two different CSDH cases, surgically treated with craniotomy and cortical membranectomy.

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Case Reports

Case 1

A 71-year-old male patient was admitted to our emergency unit with complaints of somnolence and progressive weakness in right upper and lower extremities. According to his medical history; he was diagnosed with coronary artery disease and since then he has been taking acetyl salicylic acid. Approximately 1 month ago, he had a minor head trauma. Due to the trauma, he had lost his consciousness for a while and since then he was having intermittent headaches. Neurological examination revealed orientation disorder (place, time, and person), confusion, lethargy, right hemiparesis more pronounced on the upper extremity. On computerized tomography (CT) hypodense CSDH (5 cm in diameter) with cortical membrane was detected on the left frontotemporal localization [Figure 1a]. Patient was referred to cardiology department for preoperative cardiac assessment. Despite medium-high cardiac risk, patient was operated and there was no complication or significant cardiac problem during and after the operation. Minimal residual hematoma was detected on CT scan postoperatively [Figure 1b].

Case 2

A 74-year-old female patient was referred to our Neurosurgery Department with complaints of dysphasia, unreasonable

crying and right hemiplegia. Weakness in the right arm and leg deteriorated during last month. According to her medical history; she was diagnosed with Alzheimer's disease and was under antiAlzheimer medication. Neurological examination revealed orientation disorder and hemiplegia in the right upper and lower extremities. Apart from this, nazolabial sulcus was not seen clearly on the right side of her face. On the CT scan, which was performed 6 months ago; a hypodense lesion on the left hemisphere, with a diameter of 4–5 cm, was noticed. Moreover cortical sulci were not seen clearly and minimal shift to the right side was also noticed. On both CT and magnetic resonance imaging (MRI) scan, CSDH on the left frontotemporal localization (approximately 5 cm) with cortical membrane, which compressed brain parenchyma was detected [Figure 2]. Patient was successfully operated. After the operation reexpansion of brain parenchyma without any residual subdural hematoma (SDH) was seen on CT scan [Figure 3].

In both cases, the frontoparietal osteoplastic craniotomy was performed. After the duramater incision, cortical membrane was almost totally excised. Subdural space was also spontaneously drained by silicon drainage catheter. Postoperatively on the second day, drainage catheter was removed.

In the postoperative period, neurological deficits of both patients including hemiplegia and dysphasia resolved significantly.

Discussion

Different surgical procedures have been applied in the management of CSDH. Although there is no standard accepted surgical procedure in CSDH, the common concepts range from burr-holes or twist-drill hole to craniotomy with membranectomy. No difference was demonstrated in terms of clinical outcomes and recurrences between burr-holes and craniotomy with membranectomy in most studies.[1-5]

Lee *et al*. compared three different primary surgical methods (burr-holes, enlarged and extended craniectomy with partial membranectomy) in 172 patients with CSDH. In this study the general outcome of the patients was good regardless of surgical method. The rate of re-operation was 16% in the group of burr-hole drainage, whereas were 18% and 23%, in partial membranectomy with enlarged and extended craniectomy, respectively.[5] Unlike our observations, they found that recurrent CSDH was more frequent in patients who underwent cortical membranectomy.[5] According to their opinion; in early stages of CSDH (proliferative phase) removing of cloth and hemorrhage could be adequate whereas in late stage, partial or total membranectomy should be added to surgical procedure.

Nowadays the treatment with burr-hole is more preferable than craniotomy in most clinics. In our opinion, the problem

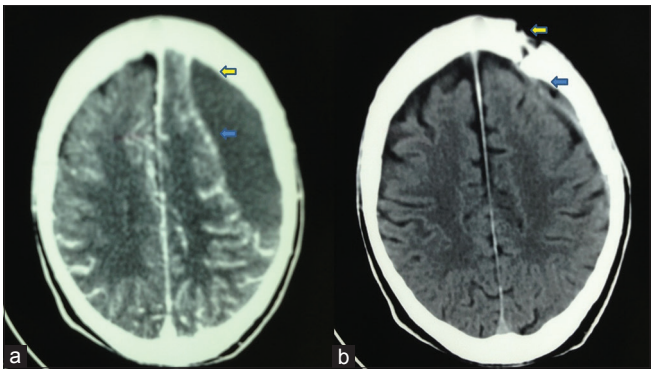

Figure 1: (a) Axial nonenhanced computerized tomography (NECT) scan shows left frontoparietal, hypodense chronic subdural hematoma. Cortical membrane of hematoma (blue arrow), calvarial surface of hematoma (yellow arrow). (b) In postoperative axial NECT scan craniotomy defect (blue arrow) and minimal residual hematoma (yellow arrow) are seen

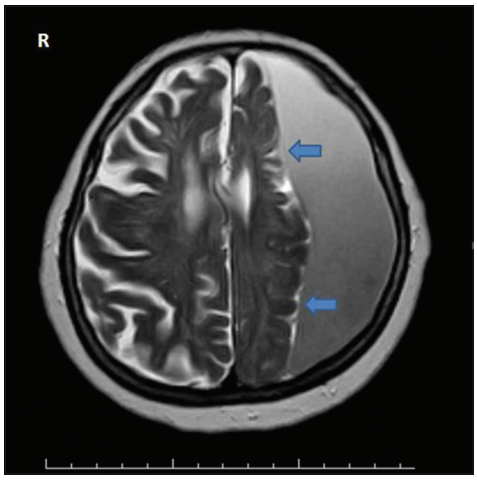

Figure 2: Axial T2-weighted magnetic resonance imaging image showing left frontoparietal chronic subdural hematoma which is hyperintense according to brain parenchyma. Arrow shows the cortical membrane

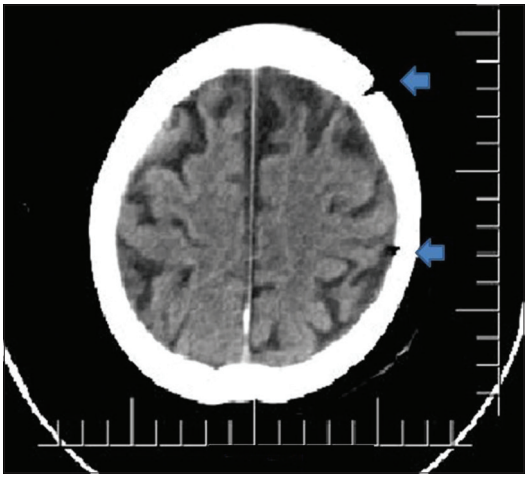

Figure 3: Postoperative axial nonenhanced computerized tomography scan shows reexpansion of brain parenchyma without any residual/recurrent subdural hematoma and arrows show craniotomy defects

is to know preoperatively whether the CSDH is organized or not. Contrast-enhancement MRI may give useful information about this situation. This knowledge may help for optimal surgical strategy. MRI is a useful method especially in following situations; estimation of the age of CSDH, the detection of CT-isodense CSDH and a small clot near the skull base and vertex and the extension of CSDH. In addition, contrast-enhanced MRI may show the connective tissue reactions occurring during the maturation of CSDH.[6,7]

In the treatment of CSDH with burr-hole; failure is usually due to the presence of septations within CSDH producing noncommunicating compartments or to excessive formation of solid membranes.[6,8,9] The neuroendoscopic operative technique is safe and satisfactory for the treatment of septated CSDH. This technique allows to excise neomembranes and achieve the efflux of the hematoma.[6,8,9] Hellwig *et al*. suggested the endoscopic operative techniques combined with closed-system draining as an alternative to the membranectomy in the treatment of loculated CSDH.[8] However, when contrast-enhanced MRI detects CSDH with completely solid membranes, endoscopy is not sufficient, and a craniotomy should be primarily performed.[6]

Kim *et al*. reported that 16 patients underwent a small and 42 patients underwent a large craniotomy of 317 consecutive patients with CSDH as the initial treatment.[10] In their study the recurrence of hematomas requiring re-operation occurred in 50% and 10% of the small and large craniotomy patients. They observed no significant differences in postoperative neurological status, complications, or days of hospital stay between these two groups and suggested that the large craniotomy with extended membranectomy reduced the re-operation rate compared with the small craniotomy.[10] On the other hand, Khadka *et al*. reported favorable outcome in 98.6% of 365 patients who underwent single burr-hole drainage.[11]

We recommend craniotomy with membranectomy in the following cases: CSDH with presence of dyshomogeneous areas with high-density margins, multiple compartments, septations, and various bleeding foci in MRI and the cases of recurrent CSDH. In our cases; both patients had serious neurological deficits when they were admitted. On the CT and MRI scan, visceral membrane, which filled cortical surface and compressed brain tissue was seen. Craniotomy was performed in both cases. Both calvarial subdural membrane and cortical membrane were excised almost subtotally. In early postoperative period, patients' all neurological deficits including hemiplegia and orientation disorders resolved within 24–72 h dramatically.

Chronic subdural hematoma causes increased intracranial pressure so that its surgical treatment is crucial and complications are life-threatening. It is reported that the decrease in the intracranial pressure after the operation may result in recurrent epidural or subdural hemorrhage.[12] In addition, long-term compression of the cerebral parenchyma can also cause loss of structural elasticity and cerebral cortical atrophy.[1,3,12] In contrast, rapid decrease in the intracranial pressure after craniotomy may also result in separation cortex from duramater and cerebral atrophy.[12,13] As a consequence; drainage of CSDH may also cause acute SDH, which is related to perioperative parenchymal shift and tension and damage in contralateral bridging veins or other sensitive cortical vascular structures.

In addition complication rates associated with burr a-hole subdural drainage is reported as 5.4–19%.[2,13] These complications are; acute or chronic SDH, intraparenchymal hematoma, tension pneumocephalus, epilepsy, pneumonia, empyema and other infections related to the procedure. Even if intracranial pressure decreases into normal limits, there can be residual hematoma after the procedure. Re-operation is needed in 12–22% of patients with residual hematoma according to the literature.[2] Incidence of the postoperative epilepsy is reported 3–10%, on the other hand subdural empyema, brain abscess and meningitis is <1%. Contralateral hemorrhage incidence is <4% and generally occurs 3–6 weeks later the procedure.[2] In most of the cases, CSDH occurs while acute SDH might also be seen in some of the cases. Unfortunately, the partial membranectomy in the CSDH patients may cause local brain herniation, which should be treated with emergent surgery and may result in permanent neurological deficit and death.[13,14]

Conclusion

We recommend that craniotomy and subtotal membranectomy may be a more adequate choice in such cases. This report underlined that craniotomy is still an acceptable, safe, efficient and even a better procedure in the patients with CSDH.

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