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Evaluation of transcranial surgical decompression of the optic canal as a treatment option for traumatic optic neuropathy

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ABSTRACT

Purpose: Traumatic optic neuropathy (TON) is a serious complication of head trauma, with the incidence rate ranging from 0.5% to 5%. The two treatment options widely practiced for TON are: (i) high-dose corticosteroid therapy and (ii) surgical decompression. However, till date, there is no consensus on the treatment protocol. This study aimed to evaluate the therapeutic efficacy of transcranial decompression of optic canal in TON patients.

Methods: A total of 39 patients with visual loss resulting from TON between January 2005 and June 2013 were retrospectively reviewed for preoperative vision, preoperative image, visual evoked potential (VEP), surgical approach, postoperative visual acuity, complications, and follow-up results.

Results: All these patients underwent transcranial decompression of optic canal. During the three-month follow-up period, among the 39 patients, 21 showed an improvement in their eyesight, 6 recovered to standard logarithmic visual acuity chart "visible," 10 could count fingers, 2 could see hand movement, and 3 regained light sensation.

Conclusion: Visual evoked potential could be used as an important preoperative and prognostic evaluation parameter for TON patients. Once TON was diagnosed, surgery is a promising therapeutic option, especially when a VEP wave is detected, irrespective of the HRCT scan findings. Operative time between trauma and operation is not necessary reference to assess the therapeutic effect of surgical decompression. The poor results of this procedure may be related to the severity of optic nerve injury. The patient's age is an important factor affecting the surgical outcomes.

1. Introduction

Traumatic optic neuropathy (TON) is trauma-induced acute optic nerve injury. There are two treatment options widely practiced: high-dose corticosteroid therapy and surgical decompression. However, the 2013 Cochrane Review states that there is no convincing evidence that steroids provide any additional visual benefit in TON [1]. Surgical decompression is performed by the otolaryngologist and neurosurgeon with different surgical techniques (intranasal endoscopic and transcranial approach). The theory of surgical decompression is that the mechanical pressure to the intracanalicular optic nerve from the hematoma or supporting structures can be relieved by reversing ischemic changes or by removing bony fragments that impinge on the nerve [2]. Although much has been written on this subject, the benefit of surgical decompression remains unclear [3–5]. This article presents our experience in 39 cases with traumatic optic neuropathy treated in our department by transcranial decompression of the optic canal from January 2005 to June 2013.

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2. Methods

2.1. Patients

This study included 39 head injury patients (aged 6–52 years; mean (23.4 years), who had undergone transcranial decompression of the optic canal in our department after they suffered from head injury during an eight-year period (January 2005–June 2013). Diagnosis of TON was made by an experienced ophthalmologist for patients who presented with rapid deterioration of vision acuity or loss of light perception after a history of head trauma. The time interval between injury and the surgery was 6 h to 30 days. All patients were subjected to high resolution computed tomography (HRCT) scan of the head and visual evoked potential (VEP) assessment before surgery to confirm TON. The results were analyzed using unpaired *t*-test. Two experienced neurosurgeon did operate for this case series.

2.2. Operative indication

Subjects with the following indications were considered for surgery: (1) gave a history of head injury and progressive decline or immediate loss of eyesight, even if HRCT scan indicated no definite fracture in the optic canal, (2) HRCT scan showed fracture or shift in the bony optic canal, with presence of a local hematoma (Fig. 1) and (3) preoperative VEP scan showed a prolonged absolute latency or amplitude reduction (Fig. 2).

Fig. 3

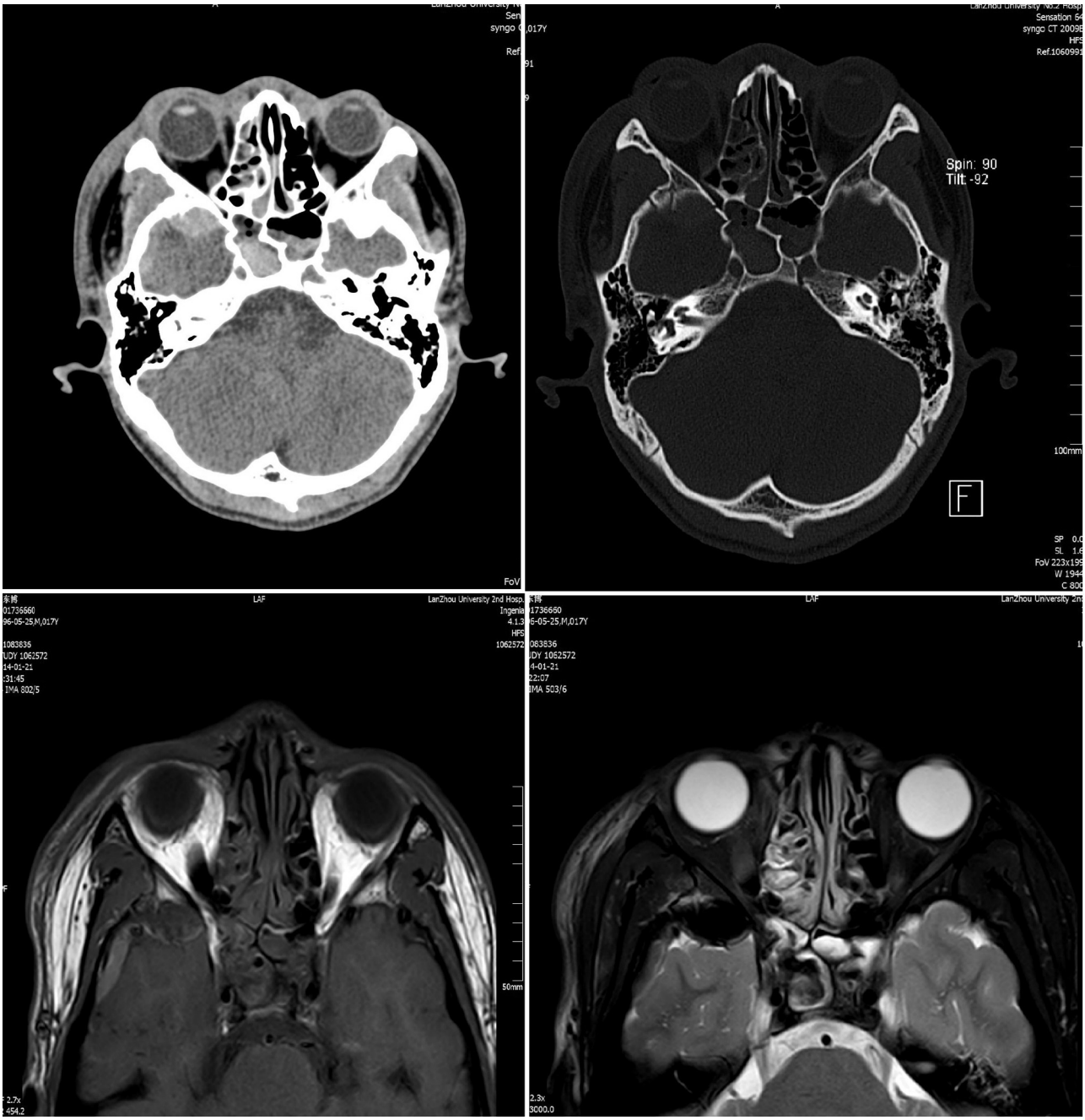

Fig. 1. HRCT and MRI scans showing hematoma in the right sphenoid sinus/cellulae ethmoidales, a tiny epidural hematoma in the right temporal pole, and the fracture of the right bony optic canal.