• Letter to the Editor •

Endoscopic transnasal optic canal decompression for pediatric traumatic optic neuropathy with no light perception

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Dear Editor,

We reported the results of endoscopic transnasal optic canal decompression (ETOCD) procedure in 3 pediatric cases (9 to 12y, mean age 10.3y) of traumatic optic neuropathy (TON) with no light perception suffering from road traffic accident.

TON is a rare but serious complication secondary to ocular or head trauma, resulting in partial or complete visual loss. In China, the incidence of road traffic accident induced TON is on the rise. The rate of incidence has been reported about 0.5% to 5% in closed head trauma cases[1]. Initial clinical findings of TON include sudden decrease of visual acuity or visual field defect, a relative afferent pupillary defect (RAPD), and normal appearance of the optic nerve head on clinical retinal examination. The part of the optic nerve situated in the optic canal is the most common site of TON, for the canalicular portion of the nerve is fixed and suffered from external force transmitted by the skull and facial bones to the optic canal[2]. The initial visual acuity is a strong predictor of prognosis. Although the visual acuity of TON ranges from normal to no light perception, approximately 50% of all patients have permanent vision loss[3].

The management for TON is still disputable. Observation, various doses of intravenous corticosteroids, surgical optic canal decompression, or a combined approach can be performed for TON treatment[2,4]. ETOCD, as a less invasive approach, is a useful way for TON treatment, rising up recent years[5]. The goal of ETOCD is to remove the medial and inferior portion of the optic canal in order to release the pressure on the optic nerve. Recent studies have reported improved visual outcome following surgery[6], but not too many studies focused on pediatric patients.

This study presented the safety and effect of ETOCD for TON in pediatric patients. A routine endoscopic sphenoethmoidectomy was performed under general anesthesia during the surgical procedures of ETOCD, using the Messerklinger technique[7] (Figure 1). All of the ETOCD procedures were performed by a single neurosurgeon (Wang Y). Postoperatively, patients received systemic methylprednisolone (20 mg/kg•d) intravenous daily for 3d. This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of the First Affiliated Hospital of China Medical University (No.AF-SOP-07-1). Informed consent was obtained from all legal guardian before surgery.

Case 1 A 10-year-old boy presented with loss of vision in the right eye for 5d following road traffic accident due to motorcycle crash. He combined with multiple small subdural hematomas of brain injury (Figure 2A) and tibiofibular fracture of right leg (Figure 2B). He received intravenous methylprednisolone for 3d elsewhere with no improvement. Ocular examination revealed visual acuity of no light perception in the right eye and the positive sign of RAPD. Computed tomography (CT) scan showed a facture of right optic nerve on the medial and superior wall of the optic canal (Figure 2C and 2D).

Diagnosed as TON of right eye, he underwent an ETOCD under general anesthesia on 5th day after the trauma. Postoperatively, his visual acuity improved to light perception

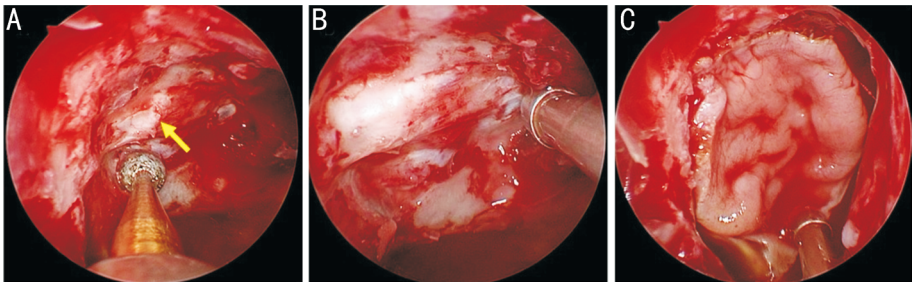

Figure 1 The surgical procedures of ETOCD A: The bulge of the optic canal was identified along the lateral wall of the sphenoid sinus. A fractured bony fragment was confirmed in the medial wall of the optic canal (yellow arrow). B: The medical wall of optic canal was thinned by a microdrill. The thinned medial wall of optic canal was removed by a micro curette. C: The skull base reconstruction was performed with the mesoturbinal flap before the end of the operation. ETOCD: Endoscopic transnasal optic canal decompression.

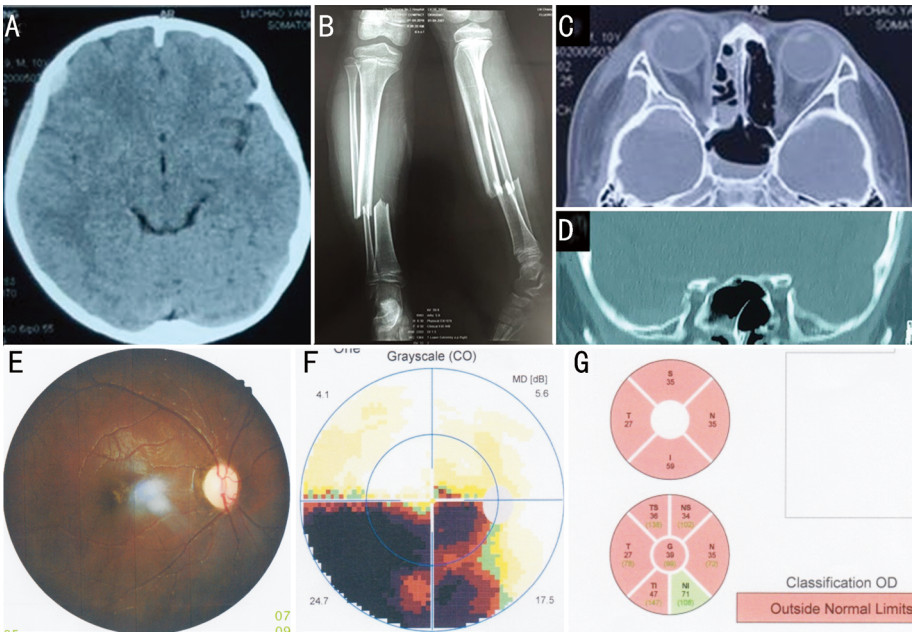

Figure 2 Case 1 A-D: Images after injury. A: CT scan of brain showed small subdural hematomas. B: X-ray examination showed tibiofibular fracture of right leg. C: CT plain scan showed a facture of right optic nerve in the medial wall of the optic canal. D: CT coronal scan also showed a facture of right optic canal. E-G: The examinations of right eye on his postoperative follow-up visit (3mo). E: Fundus photography showed disc pallor. F: Visual field improved obviously. G: Optic atrophy was observed in optical coherence tomography. CT: Computed tomography.

on 1st day, and to finger count at 30 cm on 6th day with regained color perception along with improvement in pupillary reaction. On his subsequent follow-up visit (3mo), visual acuity improved to 0.3 with obvious improvement in the pupillary reaction and visual field, though optic atrophy of right eye was observed (Figure 2E-2G).

Case 2 A 9-year-old boy presented with light perception positive vision in his right eye following a motorcycle traffic accident. He was admitted to the hospital after complaining loss of light perception 13d later. Ocular examination revealed visual acuity of no light perception in the right eye and the positive sign of RAPD, combined with proptosis and oculomotor paralysis. CT scan revealed a suspected bony impingement of right optic nerve on the medial and inferior part of the optic canal.

Following the diagnosis of carotid cavernous fistula by digital subtraction angiography, he underwent a transvenous embolization through the internal jugular vein and the superior petrosal sinus on 24th day after the trauma. Then he underwent an ETOCD 4d later. A small fractured bony fragment was confirmed on the medial wall of the optic canal during the surgery.

On the first postoperative day, proptosis and oculomotor paralysis began to improve, but visual acuity of his right eye was unchanged. His visual acuity showed improvement to light perception during the period of hospital stay. On his last follow-up visit (3mo), the visual acuity was 0.1 with obvious improvement in proptosis, oculomotor paralysis, pupillary reaction and visual field, though optic atrophy of right eye was observed.

Case 3 A 12-year-old boy presented with loss of vision in the right eye for 5d following a road traffic accident of motorcycle. He remained conscious without dizziness and vomiting, and showed no signs of any brain injury when he

was admitted to the hospital. He received 80 mg of intravenous methylprednisolone for 2d elsewhere with no improvement. On examination, the visual acuity was no light perception in the right eye, and his best-corrected visual acuity was 20/20 in the left eye. Examination showed RAPD and normal fundus. CT showed no bony impingement. Diagnosed as TON of right eye, the patient underwent an ETCOD. No fracture of the optic canal was confirmed during the surgery. Postoperatively, the visual acuity of right eye improved to light perception.

All the 3 cases were boys and pillion-riders without wearing helmets and presented with TON in right eyes. Moreover, right eyes injury maybe related to the right-hand traffic rule. Case 1 combined with multiple small subdural hematomas and tibiofibular fracture, Case 2 combined with proptosis and oculomotor paralysis, and Case 3 displayed no signs of any combined injury. In our report, 2 cases received intravenous methylprednisolone before surgery, but both showed no visual improvement. Postoperatively, all the 3 cases under ETOCD showed visual improvement with varying degrees, and without complications. Case 2 also showed significant improvement of proptosis and oculomotor paralysis. Many factors can affect TON prognosis. Patients with TON who have a good baseline visual acuity, may have a better prognosis[8]. The documented improvement after ETOCD having no light perception or light perception varies from 41% to 88%[9]. According to our unpublished data, for totally 45 TON cases with no light perception before ETOCD procedure, 68.9% patients improved visual acuity with varying degrees after surgery. Absence of an optic canal fracture is still a controversial prognostic factor[1]. In our study, optic canal fracture is not the most important factor for prognosis. According to our unpublished data, the effective rate was 72.7% in eyes with definite optic canal fracture before treatment, and 54.5% in eyes without definite optic canal fracture after injury, though there was no significant difference in the effective rate between them. In addition, the timing of intervention is also controversial. A 72-hour window theory is supported by animal studies[10]. The final visual outcome of ETOCD performed in children was not affected even after 7d of the injury in our study. According to our unpublished data, the effective rate was 57.1% in eyes operated on less than 72h after injury, and 42.9% in eyes operated on more than 72h after injury, though there was no significant difference in the effective rate. We recommended that especially for pediatric patients with no light perception less than 15d, ETOCD procedure is still a valuable treatment method. We should never give up TON patients with no light perception prematurely despite delayed presentation. It is a better choice than no intervention at all.

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