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Technical Notes & Surgical Techniques

Endoscopically assisted supratentorial evacuation of infratentorial epidural hematomas crossing the transverse sinus

Zhigang Lan[a], Seidu A. Richard[a,b], Maojun Chen[a], Chaohua Yang[a,*]

[a] Department of Neurosurgery, West China Hospital, Sichuan University, 37 Guo Xue Xiang Road, Chengdu 610041, PR China
[b] Department of Surgery, Volta Regional Hospital, P.O. Box MA-374, Ho, Ghana

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ABSTRACT

Objective: Traumatic posterior fossa extradural hematoma (TPFEDH) is a serious complication of cranial injury and the orthodox technique for removal of TPFEDH encompasses a suboccipital craniectomy or craniotomy. However, in some cases, the TPFEDH might extend to the supratentorial space, thus appearing to be crossing the transverse sinus. Contrary to the standard way, a modified supratentorial transoccipital approach may be better suitable in the management of this subtype of TPFEDH.

Methods: The clinical data of 34 consecutive patients in which the TPFEDH was crossing the transverse sinus were prospectively assessed. We operated all the parents using the supratentorial transoccipital approach via supratentorial liner incision. The supratentorial extradural hematoma (EDH) was evacuated and the endoscope was used to fully evacuate the infratentorial compartment. Glasgow Coma Scale at discharge (dGCS) was documented and Glasgow Outcome Scale score (GOS) was measured at 3–15 months (mean = 5.4 months) follow-up subsequently.

Results: The average operation time was 44 min (30–60 min). The blood loss was so minimal that the intraoperative blood transfusion was unnecessary for all the patients. Complete hematoma removal was achieved on all the patients. The average dGCS and GOS were 14 and 4.9 respectively. One case suffered from primary brain stem injury whose GOS scored only 3 on follow up. There was no surgery related mortality at discharge and during the follow-up.

Conclusion: This is the first case series to demonstrate the removal of TPFEDH crossing the transverse sinus via the modified supratentorial transoccipital craniotomy. This approach was proven to be more effective in managing such cases.

1. Introduction

Traumatic posterior fossa extradural hematomas (TPFEDH) usually occur in the posterior fossa as a result of head injuries. A bridge in the transverse sinus is the most frequent site of bleeding in TPFEDH [1–3]. Surgical evacuation of TPFEDH normally encompasses performing a craniectomy around the hematoma in the posterior cranial fossa [4]. While most TPFEDHs were confined to the infratentorial region, some many extend to the supratentorial region, resulting in a crossing pattern over the transverse sinus. The current surgical approach may be too time-consuming and carries higher complication rates due to the unique anatomy of the posterior fossa, especially for those hematomas that are crossing over the transverse sinus. We hereby present 34 cases of TPFEDH crossing the transverse sinus. We used the modified supratentorial transoccipital craniotomy to evacuate the supratentorial extradural hematoma (EDH) and an endoscope assisted approach to fully evacuate the infratentorial compartment.

2. Material and methods

2.1. Patient physiognomies

Thirty-four consecutive patients (Male: female = 5:1, 8–50 years, mean 29.5, median 45) with TPFEDH which the hematoma was crossing the transverse sinus were included in our study. All the patients were admitted at the Department of Neurosurgery, West China Hospital from December 2010 to May 2016. The ethical committee of our hospital full approved our study. The patients as well as their relatives were informed about our intension to involve them in a study and they agreed to partake in the study. They also agreed to the publication of their information. All the patients signed the concern form before operation was carried out. Clinical details of the patients are as summarized in Table 1. Other co-morbid diseases were also assessed during our evaluation. Three patients had atrial septal defect for 5 years, one had fractured femur shaft and two had delayed intracerebral hematoma on the contralateral side.

* Corresponding author at: Department of Neurosurgery, Post Graduate Training Centre, West China Hospital, Sichuan University, 37 Guo Xue Xiang Road, Chengdu, Sichuan 610041, PR China.
E-mail address: yangchaohua999@126.com (C. Yang).

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Table 1
Clinical details of the patients (MVA, motor vehicle accident; Op-time, operation time; aGCS, admission Glascow Coma Scale; dGCS, discharge Glascow Coma Scale).

No	Age	Sex	Mode of injury	aGCS	Symptoms	dGCS	Op-time (min)	Associated condition	GOS
1	46	m	Falling during work	15	Headache, vomitting	15	40		5
2	45	m	Falling from stairs	9	Headache, vomitting, dizziness	15	46		5
3	60	f	Falling while walking	8	Coma	10	35		5
4	5	m	Falling during shower	8	Vomitting, coma	12	48	Atrial septal defect for 5 y	5
5	1	m	Falling from chair	15	Vomitting	15	37		5
6	50	m	MVA	5	Coma	8	60	Delayed hematoma	3
7	38	m	Falling from height (1 m)	8	Headache, vomitting, coma	10	56		5
8	49	m	Falling from a ladder	15	Headache, vomitting	15	34		5
9	49	m	MVA	10	Headache, vomitting, otorrhoea	14	35		5
10	23	m	Hit by a wooden stick	13	Headache	15	58		5
11	36	m	Falling because of seizure	8	Vomitting, coma	13	47	Tuberculous meningitis related	5
12	54	m	Falling during shower	13	Headache	15	57		5
13	38	m	MVA	8	Headache, vomitting, coma	13	44		5
14	45	m	Falling from stairs	13	Headache	15	36		5
15	20	m	MVA	8	Headache	10	57		5
16	45	m	Falling during shower	10	Headache, vomitting	14	32		5
17	60	m	Falling from height (2 m)	12	Headache, vomitting	15	45		5
18	49	f	Falling from height (4 m)	15	Headache, vomitting	15	34	Cervical injury	1
19	16	f	Falling from stairs	15	Headache	15	36		5
20	18	f	Falling from stairs	15	Headache, vomitting	15	37		5
21	29	m	Falling from height (2 m)	10	Headache, vomitting	15	45		5
22	68	m	Falling while walking	12	Headache	14	57		5
23	50	m	Falling while walking	13	Headache	15	56		5
24	37	m	Hit by a beer bottle	10	Headache, vomitting	15	43		5
25	42	m	Falling while walking	6	Headache, vomitting, coma	14	35		5
26	48	m	Falling while walking	12	Headache	15	46		5
27	69	f	Falling from bed	15	Headache	15	32		5
28	39	m	Falling from height (3 m)	9	Headache	15	43		5
29	43	m	MVA	9	Headache, vomitting	15	46		5
30	42	m	Falling while walking	14	Headache, vomitting	15	47		5
31	82	f	Hit by a metal rod	9	Headache	14	57	Delayed hematoma	5
32	49	m	Falling from height (15 m)	12	Headache	15	49		5
33	5	m	Falling from sofa	14	Headache, vomitting	15	39		5
34	49	m	Falling from height (2 m)	13	Headache, vomitting	15	34		5
1	46	m	Falling during work	15	Headache, vomitting	15	40		5

Fig. 1. A Preoperative picture of the patient who was placed in the right park-bench position with a linear incision. (A to B as the normal incision length, B to C as contingency incision) while Fig. 1B is an intraoperative view after evacuation of the supratentorial portion of the hematoma. The portion of hematoma straddling the transverse sinus could be visualized on the lower rim of the bone flap (indicated by arrow).

2.2. Treatment modality

After primary resuscitation and clinical evaluation, CT scan of the head was done and the patient was admitted to the neurosurgical intensive care unit (NICU) except those who showed signs of brain herniation. Patient's with herniation were directly sent to emergency operation room for emergency surgery and were admitted to NICU afterwards. The nature of head injury was confirmed using the initial CT scan, time of injury, as well as Glasgow Coma Scale on admission (aGCS). The management of the patients comprised of intensive care treatments and supervision, mechanical ventilation as well as intracranial pressure (ICP) monitoring as required. Sedatives, vasopressors (e.g. Dopamine), mannitol, antiepileptics, H2–receptor blockers were administered as and when required. Serial CT scans as well as craniotomies were done to remove of other hematomas and/or other decompressive procedures as and when clinically signposted.

2.3. Surgical details

All the patients were operated on in the park-bench position under general anesthesia. Based on the of CT scan findings, the craniotomy margin was calculated to overlie the supratentorial part of the extradural hematoma (EDH). A linear paramedian incision was utilized and muscle and periosteum were retracted by means of a mastoid or spinal retractor (Fig. 1A**).** The incision can extend below the superior nuchal line for about 1 cm for extra exposure. We used a high-speed drill and cutter (Medtronic, USA) to perform a small craniotomy (3–4 cm). The