Adverse events after surgical treatment of Chiari malformation type I

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Disclosure

The authors have no financial COI to disclose concerning the presentation.
Introduction

Chiari malformation (CM) is a well-known disorder caused by descent of the cerebellar tonsil. In spite of accumulated evidences, the standard surgical management has not been established. Although relatively rare, significant surgical complications and post-operative adverse events have been reported. In this study, we retrospectively analyzed clinical results including adverse events in our recent surgical series of CM type I. The purpose of this study was to understand the clinical features and the current appropriate management of this disorder.
Materials and Methods

Consecutive 27 patients that underwent surgical treatment in our hospital past 6 years were reviewed. There were 8 men and 19 women, aged from 12 to 74 years (mean 35.6). Six of them were re-operated cases 5 to 17 years after the previous surgeries in other hospitals. Two of them had past history of tuberculosis or traumatic subarachnoid hemorrhage, and had undergone V-P shunt. Twenty-three cases (85.2%) had syringomyelia. Preoperative symptoms included lower cranial nerve deficits 6 cases (22.2%), motor weakness 17 cases (63.0%), sensory deficits 19 cases (70.4%) and headache 13 cases (48.1%).

All cases underwent foramen magnum decompression (FMD) including suboccipital craniectomy and C1 laminectomy. Duraplasty was carefully performed under microscope using artificial dura (Gore-Tex) in 20 patients. One patient without syringomyelia underwent outer layer removal of the dura. For 6 patients of re-operation, autologous femoral fascia was used to decompress and repair the dura mater. Concomitant syrinx-subarachnoid shunt (S-S shunt) was performed in one of them.
Foramen magnum decompression

Suboccipital craniectomy up to the inferior nuchal line and laterally to the lateral edge of the foramen magnum

Duraplasty: careful suturing and tenting to the upper edge of craniectomy site

Opening of dura with preserved arachnoid

Duraplasty using artificial dura; Tenting to bony edge

Reoperation case

Remove the previous artificial dura

Remove hypertrophied arachnoid

Duraplasty using femoral fascia
Results

Follow-up periods ranged from 6 to 72 months. Twenty-four cases (88.9%) showed some improvement of symptoms after surgery. Improved symptoms included cranial nerve symptoms in 33.3%, motor deficits in 88.2%, sensory deficits in 73.7% and headache in 100%. All 23 patients with syringomyelia showed decreased size of the syrinx after surgery although 2 of them showed re-expansion of syrinx without deteriorated symptoms.
Complications and Adverse events

1) There was no CSF leakage at the decompression site.

2) One case of reoperation showed temporary abducens palsy for 2-3 weeks after surgery. Another case of reoperation suffered from massive cerebellar hemorrhage at 3 years after surgery. This case did not show improved was transferred to other institute.

3) Two adolescent cases showed C1 anterior arch fracture at 11-12 months after surgery. They presented with an acute neck pain during daily activities without any traumatic events. CT-scan revealed the anterior arch fracture. Because of sclerotic changes at the middle portion of the anterior arch, this fracture was considered to be caused by long-term mechanical stress. They were successfully treated conservatively with neck collar.
Adverse events: Anterior arch fracture
Conclusion

Foramen magnum decompression with meticulous surgical procedures for duraplasty will prevent CSF related complications with reasonable surgical results. C1 anterior arch fracture was considered to be a stress fracture following posterior arch laminectomy. Careful follow-up will be necessary after FMD. Acute neck pain during follow-up should be examined with CT scan to assess C1 anterior arch abnormality.