Use of Screw-Rod System in Occipitocervical Fixation

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Background: This study retrospectively reviewed 9 patients who underwent occipitocervical fixation with a newly developed screw-rod fixation system between April 2004 and November 2005. The objective was to evaluate the clinical result of occipitocervical fixation with the screw-rod fixation system, including symptom relief, fusion rate and complications.

Methods: All 9 patients received occipitocervical fixation surgery with screw-rod fixation system and autologous bone grafts for fusion. Fusion was assessed by plain cervical X-ray films, and the myelopathy by Nurick scale.

Results: Four males and 5 females were enrolled into this study. Mean age was 58.8 years, and mean follow-up period was 15 months. One female patient experienced surgical site infection with instrument pullout 20 months after surgery; she received a second operation for instrument revision. The overall fusion rate was 100%. The mean Nurick scores were 3 preoperatively and 2.1 postoperatively, with advancement of 0.9 points on average. Seven of 9 patients experienced pain or myelopathy improvement. There were no complications except for the 1 infection mentioned above.

Conclusion: The fusion rate, complication rate and improvement in neurological function of occipitocervical fixation surgery using the screw-rod system were comparable to those of the widely used wire-rod system and screw-plate system. [*J Chin Med Assoc* 2009;72(1):20–28]

Key Words: cervical spine, instrumentation, occipitocervical fixation, occiput

Introduction

Occipitocervical fixation is a challenging field in spinal surgery. Many authors report excellent results from occipitocervical fixation by using various internal fixation instruments, including wire-rod system and plate-screw system, which are currently widely used. We present our clinical experience of occipitocervical fixation using the newly developed screw-rod system.

Methods

Between April 2004 and November 2005, 9 patients received occipitocervical internal fixation surgery in the neurosurgical department of Taipei Veterans General Hospital. Their medical records and imaging studies were reviewed. These patients included 4 males and 5 females, with a mean age of 58.8 years (range, 30–77 years). The mean follow-up period was 15 months (range, 6–26 months). The etiologies of their occipitocervical instability were trauma, degeneration, tumor growth, rheumatoid arthritis and os odontoideum. The radiologic findings and surgeries they received are summarized in Table 1. Four of them had occipitocervical malalignment, and wore halo-vest for external fixation pre- and postoperatively; the other patients wore rigid neck collar (Miami J collar, Philadelphia, PA, USA) postoperatively until fusion was achieved.

All patients received awake intubation, and the surgical position was prone, with head fixed with Mayfield head holder. Four patients with occipitocervical malalignment wore halo-vest for turning from supine position to prone position, the others wore rigid neck collars for turning position. The incisions were at midline, from external occipital protuberance

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Table 1. Clinical data of patients who received occipitocervical fixation surgery

Patient	Sex	Age (yr)	Etiology	Radiologic findings	Preop traction and postop halo-vest fixation	Surgery	Follow-up	Preop/postop Nurick scale	Fusion time
1	F	66	Trauma	C1 burst fracture, C2 Hangman's fracture type III, basilar impression, posterior compression of cervico-medullary junction at the level of foramen magnum	Yes	Partial suboccipital craniectomy, total laminectomy from C1 to C6, fixation of C0-4-5-6, PLF	7 mo	5/2	3 mo
2	M	70	Degeneration	C1-2 instability with severe stenosis at the level of cervicomedullary junction and C1, right-side high-riding vertebral artery	No	Partial suboccipital craniectomy, C1 laminectomy, fixation of C0-2-3-4, PLF	6 mo	4/3	6 mo
3*	F	58	Trauma	C1 posterior arch defect, C1-2 subluxation, basilar impression, posterior compression of cervicomedullary junction	1st operation: yes; 2nd operation: no	1st operation: partial suboccipital craniectomy, C1 laminectomy, fixation of C0-2-4-5, PLF; 2nd operation: revision with new fixation of C0-2-3, PLF	26 mo	1st operation: 4/3; 2nd operation: 3/3	1st operation: nonunion; 2nd operation: 6 mo
4	F	59	Tumor	A dumbbell-shape tumor mass in left C2-3 intervertebral foramen with left C2 lateral mass erosion	No	Laminectomy of C1-2-3 with tumor removal; fixation of C0-3-4; PLF	24 mo	0/0, pain eliminated	5 mo
5	F	54	Rheumatoid arthritis	C1-2 subluxation, spondylotic change of C2-3-4, posterior compression at C1 level, right side high-riding vertebral artery	No	Laminectomy of C1, fixation of C0-2-3-4, PLF	20 mo	1/1, pain and hand numbness improved	6 mo
6	M	74	Trauma	C1-2 subluxation with cranial settling, left-side high-riding vertebral artery, spinal stenosis at C1 and C4-5 to C6-7 level	No	Total laminectomy of C1 to C6, fixation of C0-2-3-4, PLF	12 mo	2/1, hand clumsiness and spastic gait improved	5 mo
7	M	77	Os odontoideum with trauma	C1-2 and C3-4 subluxation, cranial settling, severe spinal stenosis from foramen magnum to C5 level	No	Partial suboccipital craniectomy, total laminectomy from C1 to C5, fixation of C0-2-4-5, PLF	16 mo	5/5	7 mo

(*Continued*)