

A nighttime photograph of a modern building complex. In the foreground, there is a large, illuminated glass dome structure with a white interior. Several palm trees are visible in front of the dome. In the background, there are several tall, multi-story buildings with many lit windows. The sky is dark with some clouds. The overall scene is brightly lit by the building's lights and the dome's interior lights.

EBM presentation

Reh Yu-lin, Tasi



Patient Profile

- Name: 張X仁
- Chart ID.: 14176010
- Age: 20 years old
- Gender: male
- Date of admission: 96/03/13 from NS



Chief Complaint

- Paralysis of bilateral leg since traffic accident on 2007.1.5



Present Illness

2007.1.5

- ◆ Lost of consciousness due to Traffic accident

2007.1.5 ER ->NSICU

- ◆ persistent coma status ->on endo
- ◆ vertebral fracture over C3, and T3~T4 level
- ◆ Left clavicle fracture
- ◆ Left pneumothorax
- ◆ Bilateral hemothorax



Present Illness

2007.1.23 NSICU ->NS
◆tracheostomy

2007.2.8 NS -> NSICU
T345 laminectomy and T1~7 ORIF

2007.2.8 NSICU ->NS

2007.2.15 NS
◆Left clavicle fracture ->ORIF



Present Illness

2007.3.13 NS ->REH





Past History

- diabetes mellitus: denied
- hypertension: denied
- heart disease: denied
- operation history: denied
- smoking history: denied
- alcohol: denied
- beta nut: denied



Physical Examination

- HEENT: n.p.
- Neck: tracheostomy wound
- Chest: pick tail wound
- Abdomen: n.p.
- Extremities: bilateral leg paralysis
- Skin: no skin rashes, pressure ulcer over right foot and knee



Neurological examination

- MENTAL STATUS:
GCS: E4VtM6
JOMAC: fair to good
- HIGH CORTICAL FUNCTION:
- Language: Fluency: NT, Repetition:NT,
Comprehension:good, Naming:NT
- Speech dysarthria(-), apraxia(-)



- CRANIAL NERVE: intact
- MOTOR FUNCTION

MAS(RU/RL/LU/LL):(0/1/0/1)

M.P.:	R't		L't
	5	Upper limbs	5
	0	lower limbs	0

DTR	R't		L't
	++	Upper limbs	++
	+++	lower limbs	+++

Barbinski's sign: negative



- SENSORY:

R't			L't	
L.T.	P.P.		L.T.	P.P.
2	2	C2~T4	2	2
1	1	T5	1	1
1	1	T6	1	1
0	0	T7~S4	0	0

- AUTONAMIC SYSTEM

Bladder: sens (-), voiding(-), sphincter control(-)

Bowel: sens (-), voiding(-), sphincter control(-)



Functional Status

- Rolling to L't: poor to R't: poor

Balance	Static	Dynamic
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Sitting	poor	poor
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Standing	unable	unable
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Sitting: poor, Stand: unable, Transfer:
unable



BARTHEL INDEX

- Feeding 0/10
- Toilet 0/10
- Grooming 5/5, Dressing 5/10, Bathing 0/5
- Bowel 0/10, Bladder 0/10
- Transfer 0/15, Stairs 0/10, Walking 0/15

Total : 10 ->severe dependence



BARTHEL INDEX

- Feeding 0/10 Toilet 0/10 Grooming 5/5
Dressing 5/10
- Bowel 0/10 Bathing 0/5 Bladder 0/10
Walking 0/15
- Transfer 0/15 Stairs 0/10
- Total : 10 ->severe dependence



Impression

- Complete spinal cord injury (C3, T3, T4 burst fracture s/p laminectomy and ORIF), T4 paraplegia, ASIA:A
- Traumatic brain injury with suspected cognition impairment
- Left clavicular fracture s/p ORIF
- Hemothorax, post operation



Impairment

- Paraplegia
- Neurogenic bowel
- Neurogenic bladder,
- Pulmonary functional impairment
- Posture hypotension



Plan

- PT: PROM, ES, postural training, tilting table
- OT: upper limbs functional training, palm-digital functional training
- Psy: supportive
- Medication for neurogenic bladder and neurogenic bowel



Goal

- Tolerance for sitting up and fair sitting balance
- Removal of NG tube, tracheal tube, Foley tube
- Partial independent ADL
- Ambulation with wheel chair

A nighttime photograph of a large, multi-story building with a grid of windows. Several windows are illuminated from within, casting a warm glow. The building has a light-colored facade. On the right side of the building, there is vertical Chinese text. The sky is dark with some clouds. In the foreground, there is a dark area, possibly a lawn or parking lot, with some distant lights. A blue semi-transparent banner is overlaid at the bottom of the image, containing the text "EBM practice" in white.

EBM practice



Question

- Should patients who had unstable fracture of upper thoracic spine s/p surgical fixation wear in any orthosis for protection?



Background Knowledge

- Spinal orthoses are commonly used to immobilize the spine after spinal fusion surgery in order to facilitate bone fusion.
- In most cases, orthoses are worn for 3 months postoperatively to allow for radiographically evident spinal fusion.

Randall L.Braddom 3rd edition Chapter 66

Spinal cord injury



PICO

Patient	Patient with upper thoracic spine fracture s/p OP
Intervention	Orthosis protection
Comparison	Without orthosis protection
Outcomes	Progressing neurological sign, bone healing, or worsening dislocation of spine



Method

- Key words: upper thoracic spine, fracture, brace, orthoses,
- Evidence base:
 1. Cochran Library -> 0
 2. PubMed -> 3
 3. UpToDate -> 0



Result-1

Translaminar screw fixation in the upper thoracic spine

J Neurosurg Spine. 2006 Dec;5(6):527-33

- 7 patients underwent cervicothoracic fusion to treat trauma, neoplasm, or degenerative disease.
- The mean clinical and radiographic follow up exceeded **14 months**, at which time there were no cases of **screw pullout**, **screw fracture**, or **progressive kyphotic deformity**.



TABLE 1
*Demographic, presentation, operative, and complication data**

Case No.	Age (yrs), Sex	Indication for Op	Lesion	Presentation	Trans Screw Placement	Procedure	Complication
1	22, M	trauma	C-7 burst fracture, kyphotic deformity	acute paraplegia	T-1 (single screw)	Stage 1: ant C-7 corp, C6-T1 fusion w/ IBG, C6-T1 ant fixation w/ cervical plate; Stage 2: pst C5-T1 fixation w/ cervical lat mass screws, T-1 PS, T-1 trans screw	none
2	67, M	neoplasm (metastatic hemangiopericytoma)	T-2 intradural extramedullary mass, spinal cord compression	myelopathy	T-1	partial T-1 lam, T2-3 lam, T-2 facetectomy, trans screw at T-1, PS fixation at T2-3	none
3	34, M	trauma	C7-T1 disc herniation, jumped facet, spinal cord compression	Brown-Séguard syndrome	T-1 & T-2	Stage 1: C7-T1 discectomy, partial T-1 corp, arthrodesis w/ allograft & cervical plate; Stage 2: C-7 lam, lt C7-T1 facetectomy & foraminotomy, reduction of lt C7-T1 jumped facet, C5-6 lat mass screws, T1-2 trans screws, C5-T2 rod fixation	none
4	46, M	trauma	C-7 burst fracture	acute paraparesis	T-1	Stage 1: ant C-7 corp, C6-7 & C7-T1 discectomies, C-7 titanium cage & C6-T1 ant fixation w/ cervical plate; Stage 2: C5-T1 pst fixation w/ cervical lat mass screws & T-1 trans screws, bilat C7-T1 laminoforaminotomies, C5-T1 rod fixation	none
5	55, F	trauma	C7-T1 subluxation & stenosis	bilat upper-extremity weakness, neck pain	T-1	C6-T1 bilat partial lam C-6 lat mass screws, T-1 trans screws, C6-T1 rod fixation	none
6	61, M	degenerative/failed previous op	C6-7 kyphotic deformity, cervical stenosis	myelopathy, neck pain	T-1 & T-2	C3-6 pst lat mass screw fixation, trans screws in T-1 & T-2, C3-T2 rod fixation, spinous process cable from C-7 to T-1	none
7	72, F	degenerative/failed previous op	C6-7 focal stenosis	myelopathy, neck pain	T-1 & T-2	Stage 1: C6-7 discectomy, partial corp w/ allograft strut graft & ant fixation w/ cervical plate; Stage 2: pst C6-7 lam, C5-6 lat mass screws, T1-2 trans screws, C5-T2 rod fixation	lt T-2 trans screw intracanalicular, removed on postop Day 5



Result-2

Neurological and functional outcome after unstable cervicothoracic junction injury treated by posterior reduction and synthesis.

Spine J. 2006 Sep-Oct;6(5):507-13.

- 30 patients underwent surgery for unstable fracture at the cervicothoracic junction.
- Postoperative immobilization consisted of either a **Halo jacket** or a **cervicothoracic brace** worn for 2 months followed by a Minerva brace for 1 additional month.



- Clinical outcome using **neurological scale of Frankel**, radiological outcomes using computed tomographic (**CT**) scans and **plain X-ray** evaluations.
- Follow-up periods ranged from 11 to 48 months, with an average of **18 months**.
- Considering the few mechanical failures observed at the last examination, the choice of the posterior approach was appropriate as the one stage procedure.

Table 1
Demographic data of patients treated in the present study

Patient N°	Gender	Age	Mechanism of fracture	Diagnosis	AO type	Neurological level	Date of surgery	Day before surgery	Intensive care duration	Surgical procedure	Follow-up (months)
1	M	30	fall from a height	C7 fracture	C	radiculopathy C6 C7	Sep 96	8	2	C3 T1 Axis	12 months
2	F	80	road accident	C7 T1 dislocation	B	T1	Nov 96	1	21	C5 T2 Axis	Died day 29
3	M	39	ballistic trauma	T1 fracture	C	T1	Jan 98	2	76	C5 T2 Axis	48 months
4	M	32	road accident	T3 fracture	B	T4	Feb 98	0	3	T1 T6 Axis	48 months
5	F	79	fall from a height	C7 fracture	A	C7	Oct 98	1	1	C3 T2 Axis	Died day 1
6	M	73	road accident	C7 fracture	A	T4	Nov 98	20	4	C4 T2 Axis	17 months
7	M	54	road accident	C7 T1 dislocation	C	T1	Apr 99	1	—	C5 T2 Axis	12 months
8	M	40	road accident	Lateral mass fracture of C7	C	radiculopathy C6 C7	Apr 99	6	—	C6 T1 Axis	24 months
9	F	24	road accident	C7 fracture	A	T1	Aug 99	1	10	C5 T1 Axis	11 months
10	M	19	road accident	C7 T1 dislocation	B	C7	Apr 00	0	1	C5 T1 Axis	18 months
11	M	78	road accident	T3 fracture	C	T4	Oct 00	1	59	C5 T8 Axis+CDHT	16 months
12	F	41	road accident	T2 fracture	C	T4	July 01	0	—	C7 T5 CDHT	18 months
13	M	69	road accident	C7 T1 dislocation	B	T4	July 01	5	90	C3 T3 Axis	Died day 94
14	M	76	fall from a height	C7 fracture	B	C7	Sept 01	1	45	C3 T2 Axis	Died day 46
15	M	45	road accident	C7 T1 dislocation	C	T2	Sept 01	0	42	C4 T2 Axis	16 months
16	M	46	road accident	C7 fracture	A	C7	Sept 01	3	26	C5 T2 Axis	12 months
17	M	44	road accident	T3 fracture	B	T4	Nov 01	0	33	C4 T6 RRC	12 months
18	F	55	road accident	C7 fracture	A	radiculopathy C8	Nov 01	1	—	C5 T1 Axis	13 months
19	M	38	road accident	T1 fracture	C	C7	Feb 02	2	73	C4 T3 Axis	Died day 73
20	M	73	road accident	C7 T1 dislocation	C	C7	Feb 02	2	25	C4 T3 Axis	Died day 32
21	M	18	road accident	C6 and T1 fracture	B	C7	March 02	0	90	C3 T2 Axis	18 months
22	M	23	diving	C7 T1 dislocation	B	C7	Apr 02	7	27	C4-T2 Axis	24 months
23	F	80	road accident	C7 fracture	C	T2	May 02	1	70	C4-T2 Axis	16 months
24	M	49	fall from a height	T2 fracture	A	T4	Aug 02	15	—	C7 T4 CDHT	12 months
25	F	59	road accident	C7 fracture	B	radiculopathy C8	Sept 02	90	6	C3 T2 Axis	15 months
26	M	25	road accident	T3 fracture	B	T4	Sept 02	1	17	T1 T6 CDHT	16 months
27	M	52	road accident	T3 fracture	C	T3	March 03	1	80	C7 T4 CDHT+Axis	Died day 90
28	F	32	road accident	C7 fracture	B	radiculopathy C7	May 03	6	—	C6-C7 Axis	12 months
29	M	40	road accident	Lateral mass fracture of C7	B	T1	June 03	2	31	C7-T1 Axis	11 months
30	M	57	fall from a height	C7 T1 dislocation	C	radiculopathy C8	Aug 03	2	—	C5-T2 Axis	14 months

CDHT=Cotrel Dubousset Horizon Titanium; RRC=Raymond Roy Camille plate.



Result-3

The treatment of unstable thoracic spine fractures with transpedicular screw instrumentation: a 3-year consecutive series

Spine. 2002 Dec 15;27(24):2782-7

- A total of 252 pedicle screws were placed, of which 222 were placed in segments T2-L1.
- **Fracture healing** and **radiographic stabilization** occurred at an average of 4.8 months after the initial operation. There were no reported cases of hardware failure, loss of reduction, or painful hardware removal.



Result

Translaminar screw fixation in the upper thoracic spine

J Neurosurg Spine. 2006 Dec;5(6):527-33

Braced or not

X

Neurological and functional outcome after unstable cervicothoracic junction injury treated by posterior reduction and synthesis.

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V

The treatment of unstable thoracic spine fractures with transpedicular screw instrumentation: a 3-year consecutive series

Spine. 2002 Dec 15;27(24):2782-7

X



Conclusion

- There is no absolute indication for patients who had unstable fracture of upper thoracic spine s/p surgical fixation wearing in orthosis for protection?



Apply

- Yes
- But this patient should wear in SOMI for fracture of C-spine without surgical repair.



Thanks for your attention

Reh Yu-lin, Tsai

