



Management of Thoraco Lumbar Fractures

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Topic Covered


- Classifications (Stability)
- Fracture with Spinal Cord Injury
- Clearing the Spine in Unconscious
- Role & timing of decompression
- Role of steroid
- Transfer Check List




Classification



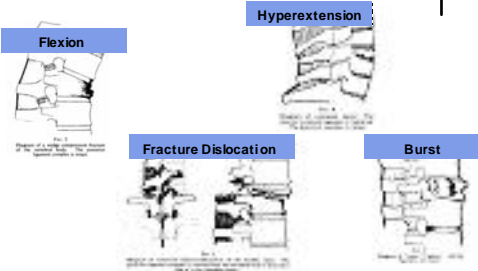
Classification




Sir Frank Wild Holdsworth, 1904 -1969



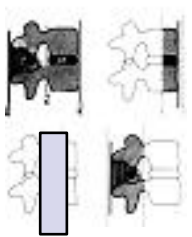
Holdsworth's Classification 1962



F.W. Holdsworth 3rd Watson-Jones Lecture . RCS England 11th Jan,1962




Denis's Classification 1983



Middle Column

Denis F, Spine 1983



Denis's Classification

Basic modes of Failure			
Type of Fracture	Column		
	Anterior	Middle	Posterior
Compression	Compression	None	None
Burst	Compression	Compression	None
Seat Belt	None	Distraction	Distraction
Fracture Dislocation	Compression	Distraction	Distraction
	Rotation shear	Rotation shear	Rotation shear

Denis F, Spine 1983

Denis's Classification

- Retrospective study
- Lack of reproducibility
- Lack of Validity

Verlan JJ et al Spine 2004

Thoraco Lumbar Injury Classification & Severity Score (TLICS)

- Injury Morphology
- Posterior Ligamentous complex (PLC)
- Neurological Status

Radiographs, CT Scan & MR Scan

Vaccaro AR et al Spine 2005

Thoraco Lumbar Injury Classification & Severity Score (TLICS)

Injury Morphology

Type	Points
Compression	1
Compression burst	2
Translation Rotation	3
Distraction	4

Vaccaro AR et al Spine 2005

Thoraco Lumbar Injury Classification & Severity Score (TLICS)

Integrity of Post Ligamentous Complex

Involvement	Points
Intact	0
Indeterminate	2
Injured	3

Vaccaro AR et al Spine 2005

Thoraco Lumbar Injury Classification & Severity Score (TLICS)

Neurological Status

Involvement	Points
Intact	0
Nerve Root	2
Spinal Cord Injury (Complete)	2
Spinal Cord Injury (Incomplete)	3
Cauda Equina	3

Vaccaro AR et al Spine 2005

Thoraco Lumbar Injury Classification & Severity Score (TLICS)

Injury Severity Score

Score	Suggested treatment
3 or less	Conservative
4	Conservative or Surgical
5 or more	Surgical

Vaccaro AR et al Spine 2005

Thoraco Lumbar Injury Classification & Severity Score (TLICS)

Table 5. Suggested Surgical Approach

Neurologic Status	Posterior Ligamentous Complex	
	Intact	Disrupted
Intact	Posterior approach	Posterior approach
Root injury	Posterior approach	Posterior approach
Incomplete SCI or cauda equina	Anterior approach	Combined approach
Complete SCI or cauda equina	Posterior (anterior)* approach	Posterior (combined)* approach

Vaccaro AR et al Spine 2005

Thoraco Lumbar Injury Classification & Severity Score (TLICS)



Compression fracture	1 point
PCL Indeterminate	2 points
Neurology intact	0 points
Total	3 points

Thoraco Lumbar Injury Classification & Severity Score (TLICS)



Compression burst	2 point
PCL definite injury	3 points
Neurology complete	3 points
Total	8 points

Role of weight bearing radiograph

Unstable fracture

1. Fracture dislocation
2. Neurological deficit
3. Vertebral Collapse > 50%
4. Kyphosis < 20 degrees

N = 28, T11 . L2 fracture

Stable fracture

1. Normal neurology
2. Non-pathological fracture
3. Vertebral Collapse > 50%
4. Kyphosis < 20 degrees

Sanderson et al Spine 2004

Role of weight bearing radiograph



Weight bearing X-ray



N = 28, T11 . L2 fracture
25% increase collapse requiring change in treatment plan

Sanderson et al Spine 2004

Unconscious patient

The Unconscious patient

Complications of prolonged immobilisation and spinal precautions (> 48-72 hours):

1. Pressure sore . 55% - septic shock, £ 17,000.
2. Increased ICT . ischemic brain injury.
3. Difficult intubation & loss of airway.
4. Difficult central venous access.
5. Poor oral care.
6. Failed enteral nutrition.
7. Gastrostasis, reflux & pulmonary aspiration . 26% mortality in adult with cervical spine injury.
8. Restricted physiotherapy.
9. Thromboembolism.
10. Cross infection.

The Unconscious patient

Plain radiographs and CT Scan allow exclusion of cervical spine injuries with > 99% sensitivity.

The Unconscious patient

The risk of prolonged immobilisation exceed those of a serious missed cervical spine injury after normal plain x-ray and CT scan imaging.

Steroids in Spinal Cord Injury

The American Practice

.n = 305

262 (86%) < 8 hours on injury

65 (25%) believe in recovery

Eck JC et al :Spine 2006 31(6)

The UK Practice

- A&E(n = 187)
128 gave steroids (80 specialist advise, 40 immediately)
- Neurosurgical units (n = 170)
7 gave steroids, 10 varied practice
- Spinal injuries unit
8 out of 10 did not use steroids

Frampton AE et al: Eur Med Journal Jul 2006

NASCIS II

National Acute Spinal Cord Injury study (NASCIS) II Study
Double blind, RCT
16 centre in USA

Group	Number
Methyl Prednisolone (MP) 30 mg/Kg	162
Naloxone 5.4 mg/Kg	154
Placebo	171

Bracken et al JAMA 2 27: 1597-160 4,19 97

NASCIS II – Results

All data analysed on Intention to Treat

MP V/S Placebo			
Recovery	6 weeks	6 months	12 months
Motor	NS	NS	NS
Sensory	NS	< 0.05	NS

NASCIS II – Results

All data analysed, MP delivered < 8 hours of injury.

MP V/S Placebo Motor recovery (%)			
Motor Recovery(%)	MP	Placebo	Significance
Complete	7.0	1.6	NS
Incomplete	44.1	20.7	P < 0.05

NASCIS II – Results

All data analysed, MP delivered > 8 hours of injury.

MP V/S Placebo Motor recovery (%)			
Motor Recovery(%)	MP	Placebo	Significance
Complete	1.5	0.7	NS
Incomplete	34.1	48.5	P < 0.05

NASCIS II

Why 8 hours ?

Physiology ?
Pathology ?
Pharmacology ?

No!! Provided numerically equal sub-groups

NASCIS II

Post hoc analysis of sub groups determined by the data represents unsound statistical practice

Original data never published or made available in an analysable format



Steroids – Other studies

Petitjean et al 1998

Randomised trial, administration < 8 hours,
Methylprednisolone 30 mg/Kg
54 steroid, 52 not

No differences observed at one year



Steroids

Otani et al 1994

Controlled trial, Methylprednisolone
30 mg/Kg. 70 steroid, 47 not

No differences observed at one year



'At present, there are no pharmacologic strategies of proven benefit. Although steroids continue to be givenevidence of deleterious effects continues to accumulate.'

Hurlbert RJ Spine. 2006



Steroids

Complications:

Infection
Perforated DU
Hyperglycaemia
Acute Steroid Myopathy



'The use of high dose steroids in the management of spinal cord injury cannot be supported on current evidence.'

British Association of Spinal Cord Injury Specialists, June 2000



The role & timing of decompression

Conservative Management



Sir Ludwig Guttmann

Postural techniques & Bed Rest

- Frankel n = 612
- Instability in 4 patients
 - 29% improved at least one grade

Frankel et al. Paraplegia 1969;7:179-82.

Conservative Management

Incomplete Cervical SCI

n = 44

bed rest x 6 weeks , mobilization in a brace x 6 weeks

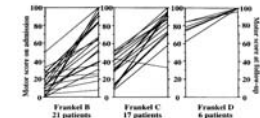
flexion & extension view for stability

neurological recovery was recorded

Katoh, et al. Spine .

Conservative Management

		Frankel grade at follow-up				
		A	B	C	D	E
Frankel grade on admission	B	0	5	8	6	2
	C	0	1	0	15	1
	D	0	0	0	3	3
	E	0	0	0	0	0



"Conservative treatment remains a good option for patients with incomplete cervical cord injuries - basis for comparison with other treatment modalities"

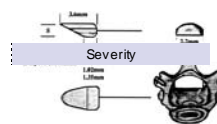
5/63 had neurological deterioration

Katoh et al. Spine 1996.

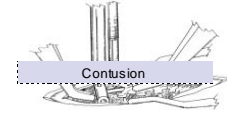
Experimental studies

Species	Timing	Result	Author
Primates	Minutes	Neurological recovery	Kobrine 78,79
Cats	Minutes	Restore Axonal conduction	Crofts 72
Dogs	Weeks	Neurological recovery	Bohlmann 1979
	Minutes	Vascular changes	Aki 1980
Rats	Minutes	Metabolic changes	Zhang 1983

Experimental studies



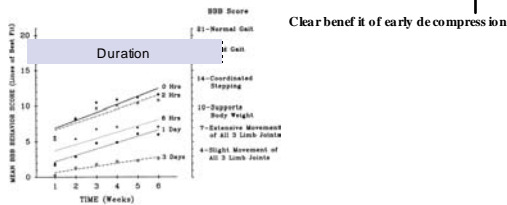
Spacers of different size:
- canal threshold 50%



Injury & spacers of different size:
- canal threshold 35%

Dimar JR et al. Spine 1999;24:1623-33

Experimental studies



Neurological recovery versus duration of compression

* BBB = Behavior Body Score

Dimar JR et al, Spine 1999;24:1623-33

Experimental studies

Neurology depends on:

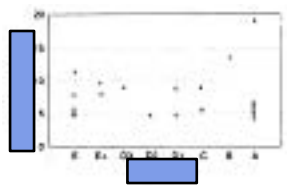
- Percentage of compression
- Duration of compression
- Contusion decreases tolerance to compression

Early decompression in Acute SCI improves the Prognosis for Recovery

Dimar JR et al, Spine 1999;24:1623-33

Clinical study

N=20, T11 - D1 fracture, FU = 2yrs



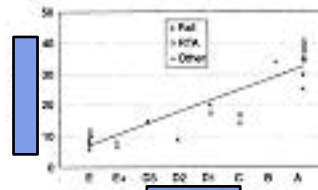
Poor correlation between Canal compromise & Neurology

R = 0.12, p = NS

Dickson et al JBJS(B) 1995

Clinical study

N=20, T11 - D1 fracture, FU = 2yrs



R = 0.91, p < 0.001

Dickson et al JBJS(B) 1995

Role of Decompression

Review article

N = 275, eligibility criteria = 60

3 prospective study

No control group

No difference in Neurological recovery with surgery

Significant complication noted in 75%

Dickson et al JBJS(B) 2000

Decompression . Prospective studies

n = 208

Acute spinal cord & Cauda equina injury

Conservative treatment = 92 (44%)

Operative treatment = 116 (56%)- included fusion(n =44)

No difference in the length of stay or Neurology

Mortality : Conservative(15.2%), Operative(6.1%)

Surgery . Higher thrombo-embolic complication rate

Tabor et al CanJ Neuro 1987

