



Long-term functional outcome after traumatic lumbosacral dissociation. A retrospective case series of 13 patients



Aron Adelled^{a,b,f,*}, Anna Tötterman^c, Thomas Glott^d, Johan C. Hellund^e,
Jan Erik Madsen^{a,f}, Olav Røise^{a,f,g}

^a Department of Orthopaedic Surgery, Oslo University Hospital, Ullevaal, Oslo, Norway

^b Department of Orthopaedic Surgery, Akershus University Hospital, Lørenskog, Norway

^c Department of Orthopaedic Surgery, Karolinska University Hospital, Stockholm, Sweden

^d Department of Spinal Cord Injury and Multitrauma Unit, Sunnaas Hospital, Nesodden, Norway

^e Department of Radiology, Oslo University Hospital, Ullevaal, Oslo, Norway

^f Faculty of Medicine, University of Oslo, Norway

^g Division of Surgery and Clinical Neuroscience, Oslo University Hospital, Oslo, Norway

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ABSTRACT

Study design: Retrospective case series.

Introduction: Traumatic lumbosacral dissociation (TLSD) is a rare subgroup of sacral fractures caused by high-energy trauma in healthy adults. There are no accepted treatment algorithms for these injuries. Neurologic deficits and pain are commonly associated with these injuries, however, little is known about the long-term functional outcome in patients with TLSD. The objective of this study was to assess long-term functional outcome in patients with traumatic lumbosacral dissociation (TLSD) injuries.

Materials and methods: Thirteen patients with TLSD were retrospectively identified and followed with clinical and radiological examination mean 7.7 (3–12) years after the injury. Five were treated operatively, and eight non-operatively. Sensorimotor impairments in the lower extremities were classified according to ASIA. Urinary function was assessed with uroflowmetry, and bowel- and sexual functions were assessed using a structured interview. Pain was assessed using a visual analogue scale (VAS), and patient-reported health with SF-36. CT images were scrutinized for non-union and kyphotic angulation across the fracture.

Results: Eleven patients had neurologic deficits corresponding to L5 and sacral roots. Urinary dysfunction was observed in nine, and bowel dysfunction in three patients. Eight patients reported problems associated with sexual activities, with pain during intercourse and erectile dysfunction being the most common problems. Twelve patients reported pain in the lumbosacral area, in combination with radiating pain in the majority. The overall patient-reported health (SF-36) was significantly lower than the normal population. All sacral fractures were united as seen on CT. Sacral kyphotic angulation was present in 11, which had increased in three patients comparing with the initial radiographs.

Conclusion: In this long-term follow-up, functional impairments, pain, and poor patient-reported health were common findings among patients with TLSD. High rates of neurologic, urinary and sexual dysfunctions were reported. Extended follow-up several years after the injury with a special focus on urogenital dysfunctions and pain management may be beneficial to these patients.

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Introduction

Traumatic lumbosacral dissociation (TLSD) is a rare subgroup of sacral fractures mostly reported as single cases or small case series [1–5]. It is also commonly denoted as a U or H-shaped sacral fracture, and mainly results from high energy trauma, such as fall from height or motor vehicle accidents [6]. Combat-related blast injuries have also been reported recently [7]. Neurologic deficits in

* Corresponding author at: Department of Orthopaedic Surgery, Akershus University Hospital, Sykehusveien 25, 1478 Lørenskog, Norway.
Tel.: +47 93404190; fax: +47 67960506.

E-mail address: aron.adelved@medisin.uio.no (A. Adelled).

the lower extremities and pain are common findings in patients after TLSD [8–10]. There is a lack of good quality reports documenting which fractures need to be treated operatively and which can be treated non-operatively. Furthermore, little information is available on functional outcome of these injuries, regarding neurologic and urogenital functions, residual pain, as well as patient-reported health in a long-term perspective.

The aim of this study was to assess long-term functional outcome, patient-reported health and radiological outcome in patients with TLSD.

Materials and methods

In this retrospective study, all patients with traumatic lumbosacral dissociation (TLSD) were identified from the Pelvic Fracture Registry at Oslo University Hospital, Ullevaal during the period of March 1997 to September 2006. Low energy, osteoporotic fractures or sacral insufficiency fractures, as well as sacral fractures as part of pelvic ring disruptions were excluded. Nineteen patients met the inclusion criteria, of which three were foreign residents and two were deceased. Of the remaining 14 eligible patients, one was not traceable and the remaining 13 patients constituted the study population of this long-term follow-up.

The following data were extracted from the patient charts: Injury mechanism, Injury Severity Score (ISS), fracture pattern, neurologic presentation, additional injuries, and treatment.

At follow-up, collected data included assessment of neurologic function, urinary, bowel and sexual function, pain, ADL, and patient-reported health (PRH) measured by SF-36. All patients also underwent radiologic examination with CT of the lumbar spine and the pelvis.

All fractures were zone-III injuries, according to the classification of Denis et al. [11]. They were further subdivided according to Roy-Camille et al. [6] on the basis of their transverse fracture pattern (Table 1). In addition, one had an undisplaced acetabular fracture, which was treated non-operatively. Five patients were treated operatively; all with open reduction and internal fixation with iliolumbar interpedicular screws (Universal Spine System), and concomitant sacral laminectomy. The remaining eight patients were treated non-operatively. Indication for operative treatment was based on an overall assessment of neurologic deficits, radiographic signs (CT) of mechanical instability or compression of neural elements, and patients' pain preventing mobilization (Fig. 1). In the absence of radiographic signs of instability or neural compression, non-operative treatment was applied (Fig. 2).

Sensory and motor function in the lower extremities and perineum was assessed using the American Spinal Injury Association (ASIA) impairment scale [12], focusing on the lumbar and

sacral roots only. Neurologic function was then graded according to Gibbon et al. [13], however modified to focus on the neurologic deficits in the L5 and sacral dermatomes; 1- no neurologic deficits, 2- sensory deficits only, 3- partial, combined sensory and motor deficits; and 4- complete loss of neurologic function.

Bladder and bowel functions were assessed separately.

Urinary bladder function was assessed by a structured interview [14] concerning frequency, urgency, hesitation or incontinence. In addition, patients with volitional voiding underwent flowmetry to measure maximum flow. Post-micturition volume was measured by ultrasound within 10 min after bladder emptying. Measurements of maximum flow were classified and graded into percentiles according to the Liverpool nomograms [15]. Overall bladder dysfunction was then graded based on the results from the interview, flowmetry, ultrasonography, and the nomograms as; 1- normal voiding pattern (same as before injury), 2- slightly changed voiding pattern, but normal flow and residual urine less than 50 mL and no incontinence, 3-significantly changed voiding pattern with reduced flow below 5th percentiles, or more than 50 mL residual urine or incontinence, and 4- no volitional voiding and regular intermittent catheterization or urinary deviation.

Bowel function was assessed by a structured interview, addressing frequency and problems with urgency, diarrhoea, constipation, or incontinence. Bowel function was graded as: (1) normal bowel patterns (same as before injury), (2) slightly changed (changes in frequency or need of medication such as laxatives), (3) completely changed with incontinence and/or need of enema or colostomy.

Problems associated with sexual function were assessed by interview with open questions. In female patients, problems related to sexual function, in particular pain during sexual intercourse or reduced arousal, was noted. In male patients, erectile dysfunction was assessed using selected questions from the Norwegian version of the International Index of Erectile Function (IIEF) questionnaire [16], pertaining to sexual activity during the past 4 weeks.

Pain was self-assessed by the patients, using a visual analogue scale (VAS) ranging from 0 to 10, with 0 representing no pain and 10 the most severe pain experienced within the last 24 h. The patients were asked to grade their average pain particularly in the lower back and posterior pelvic area. When present, radicular pain to the lower extremities was recorded. Only pain related to the lumbosacral injury was recorded, and peripheral pain caused by injuries to the lower extremities were not considered in the pain assessment.

The information regarding ambulation, activities of daily living (ADL), and return to work was obtained by a structured interview. Ambulation was defined as dependence or independence of

Table 1
Patient characteristics.

Patient no	Sex	Injury mechanism	ISS	Roy-Camille (classification, U/H)	Treatment	Age at FU	FU time Years, months
1	F	MVA	29	1 (H)	non-op.	29	9,10
2	M	MVA	9	1 (U)	non-op.	45	9,7
3	F	MVA	19	1 (H)	non-op.	36	9,5
4	M	MVA	14	2 (H)	non-op.	36	9,4
5	F	MVA	9	1 (U)	non-op.	35	6,7
6	M	MVA	22	1 (U)	non-op.	64	5,5
7	M	Fall	17	1 (H)	non-op.	46	3,8
8	M	MVA	22	1 (U)	non-op.	41	3,0
9	M	MVA	29	3 (H)	op.	56	11,11
10	M	Fall	10	3 (U)	op.	59	9,10
11	F	Fall*	29	1 (H)	op.	39	9,3
12	M	Fall*	45	3 (H)	op.	38	8,10
13	F	Fall*	50	1 (U)	op.	21	3,10

F: female, M: male, MVA: motor vehicle accident, ISS: Injury Severity Score, U/H: fracture shape, FU: follow-up.

* Suicidal jump.

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