Cervical unilateral locked facet case series

Tang et al. describe a morphology-based unilateral cervical facet interlocking classification in an attempt to clarify the injury mechanism, instability, neurological deficits, and radiological features, and determine optimum management strategies for these injuries. A total of 55 patients with unilateral cervical locked facet (UCLF) involving C3 to C7 were identified between January 1, 2012, and December 1, 2019. The injuries were classified into three types, and they were further divided into six subtypes using three-dimensional computed tomography. The injury mechanism, clinical features, neurological deficits, and imaging characteristics were analyzed, and the appropriate treatment strategies for UCLF were discussed. UCLFs were divided into the following six subtypes: UCLF without lateral mass-facet fracture (type I) in nine cases, with superior articular process fracture (type II A) in 22, with inferior articular process fracture (type II B) in seven, both superior and inferior articular process fractures (type II C) in four, with lateral mass splitting fracture (type III A) in three, and with lateral mass comminution fractures (type III B) in ten. A total of 22 (40.0%) of the 55 patients presented with radiculopathy, and 23 patients (41.8%) had spinal cord injuries. The subtype analyses showed high rates of radiculopathy in types II A (68.2%) and II C (75.0%), as well as significant spinal cord injury in types I (77.8%) and III (61.5%). Destruction of the facet capsule was observed in all patients, but the injury of the disc, ligamentous complex and vertebra had a significant difference among the types or subtypes. The instability parameters of the axial rotation angle, segmental kyphosis, and sagittal displacement showed significant differences in various types of UCLF. Closed reduction by preoperative and intraoperative general anesthesia traction was achieved in 27 patients (49.1%), and the success rate of closed reduction in type I (22.2%) was significantly lower than that in type II (51.5%) and type III (61.5%). A total of 35 of 55 patients underwent a single anterior fixation and fusion, 10 patients were treated with posterior pedicle and (or) lateral mass fixation, and combined surgery was performed in ten patients. Ten patients (18.2%) with poor outcomes were observed after the first surgery. Among them, 3 patients treated with a single anterior surgery had persistent or aggravated radiculopathy and posterior approach surgery with ipsilateral facet resection, foramen enlargement, and pedicle and (or) lateral mass screw fixation was performed immediately, 5 patients treated with a short-segment posterior surgery showed mild late kyphosis deformity, and 2 patients with vertebral malalignment were encountered after anterior single-level fusion during the follow-up. This retrospective study indicated that UCLF is a rotationally unstable cervical spine injury. The classification proposed in this study will contribute to understanding the injury mechanism, radiological characteristics, and neurological deficits in various types of UCLF, which will help the surgeons to evaluate the preoperative closed reduction and guide the selection of surgical approach and fusion segment [1)].

Injury data, radiographs, and outcomes (North American Spine Society Cervical Follow-up Questionnaire and Short Form-36) were collected from 9 centers and 13 surgeons, members of the Spine Trauma Study Group.

Causally motor vehicle accidents (49%) and sports (31%) predominated. The C6-C7 level accounted for 60% of injuries and C5-C6 represented 17%. The mean SF-36 PCS score of the operative patients with follow-up >18 months was 6.70 points higher than the mean of the nonoperative patients (P = 0.017). The SF-36 Bodily Pain mean of all patients was 67.2 (SD = 27.6), significantly lower (more pain) than the normative mean of 75.2 (SD = 23.7) (P = 0.014). Nonoperative patients also reported a mean Bodily Pain score of 63.0 (SD = 30.5) which was significantly worse than normative values (P = 0.031). Similarly, the NASS PD mean score for all patients was 84.8 (SD = 17.9), significantly lower

than the normative mean of 89.1 (SD = 15.5) (P = 0.014).

This is the largest reported series of facet injuries to date and the only one using health-related quality-of-life instruments. Unilateral facet injuries of the subaxial cervical spine led to reported levels of pain and disability that are significantly worse than those of the healthy population. Although further study is required, we suggest that nonoperatively treated patients report worse outcomes than operatively treated patients, particularly at longer follow-ups despite having a more benign fracture pattern. The presence of comorbidities, associated injuries, and advanced age adversely impact clinical outcomes [2].

Between 1973 and 1997 a total of 117 of our patients met at least one of the following inclusion criteria: unilateral locked facet dislocation (48%), bilateral locked facet dislocations (23%), unilateral “perched” facet subluxation (14%), bilateral perched facet subluxation (12%), uni- or bilateral dislocation/perched subluxation with facet fractures (3%).

Most of the lesions were located at the levels of C5/C6 and C6/7 (n=46 for each). Associated neurological deficits were present initially in 65% of patients: 35% had complete or incomplete spinal cord injuries (tetraplegia), 2% were paraplegic, and 28% had cervical radiculopathies.

Closed reduction (e.g. with the aid of a halo ring) should be carried out as soon as possible after lower cervical spine dislocation or facet-fracture dislocation, as both the success rate of reduction and the potential for recovery from neurological deficits are clearly higher when reduction is achieved within the first 4 h after the initial injury [3].

Twenty-four patients with unilateral cervical locked facets were treated between 1986 and 1990. The primary mechanisms of injury were vehicular accidents (58%) and altercations (38%). The level of unilateral facet dislocation was C5-C6 (41%), C6-C7 (25%), C3-C4 (17%), and C4-C5 (17%). Seventeen (70%) came to the hospital with radiculopathy, five (20%) were normal, and two (10%) had spinal cord injuries. Plain films showed subluxation but no fracture. All patients had a cervical computed tomographic scan. Fracture in addition to facet locking was seen in 12 (50%) of 24 scans: 5 with facet fracture, 4 with facet/laminar fractures, 2 with facet/laminar/body fractures, and 1 foramen transversarium fracture. On the basis of CT findings, closed reduction was thought to be contraindicated in two cases. Five patients (22%) underwent successful closed reductions. Two of the patients with closed reductions were placed in a halo but again had subluxation. Thus, 24 patients underwent surgery for open reduction, posterior spinous process wire fixation, and facet wiring to struts of the iliac crest for bony fusion. The initial surgery was successful in 23 (96%) of 24 patients. One patient experienced subluxation and underwent further surgery for anterior cervical fusion/plating. Two wound infections were treated, and there were no deaths or neurological worsening. At 1 year, all deficits had improved. Of 16 radiculopathies, 3 (19%) had persistent 4/5 weakness, and the rest were normal, including 2 delayed-diagnosis patients who both showed improvement from 2/5 to 5/5 strength within 1 week of surgery [4].

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Tang C, Fan YH, Liao YH, Tang Q, Ma F, Wang Q, Zhong J. Classification of unilateral cervical locked facet with or without lateral mass-facet fractures and a retrospective observational study of 55 cases. Sci Rep. 2021 Aug 16;11(1):16615. doi: 10.1038/s41598-021-96090-4. PMID: 34400738; PMCID:

PMC8367956.
2)
Dvorak MF, Fisher CG, Aarabi B, Harris MB, Hurbert RJ, Rampersaud YR, Vaccaro A, Harrop JS, Nockels RP, Madrazo IN, Schwartz D, Kwon BK, Zhao Y, Fehlings MG. Clinical outcomes of 90 isolated unilateral facet fractures, subluxations, and dislocations treated surgically and nonoperatively. Spine (Phila Pa 1976). 2007 Dec 15;32(26):3007-13. doi: 10.1097/BRS.0b013e31815cd439. PMID: 18091494.
3)
Reinhold M, Knop C, Lange U, Rosenberger R, Schmid R, Blauth M. [Reduction of traumatic dislocations and facet fracture-dislocations in the lower cervical spine]. Unfallchirurg. 2006 Dec;109(12):1064-72. German. PubMed PMID: 17109175.
4)
Shapiro SA. Management of unilateral locked facet of the cervical spine. Neurosurgery. 1993 Nov;33(5):832-7; discussion 837. doi: 10.1227/00006123-199311000-00007. PMID: 8264879.