

LETTER TO THE EDITOR

Selection of Surgical Approaches for Lower Cervical Spine Fracture and Dislocation Combined with Spinal Cord Injury in Swimmers from an Ecological Perspective

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According to a large amount of clinical practices, it is an important measure to take surgical treatment for patients with lower cervical vertebra fracture and dislocation associated with spinal cord injury. This measure is widely recognized in the medical world because it can effectively promote the recovery of the neurological function of spinal cord, and improve the effect of anatomical reduction. At present, there are two commonly applied surgical approaches for the treatment of this disease, namely anterior cervical decompression. This study observed and explored the treatment effect of different approaches through grouping, and studied the method of selecting the best approach. The report content was as shown below.

I Introduction

Chieh-Jen Shieh, Guang-Sheng Wan, Wei Wang, Yuzhou Luo. "An Empirical Study on the Performance Evaluation of Introducing Artificial Intelligence Medical Service System into Medical Ecological Environment" on Issue 107, Pages: 183-189, Article No: e107074, Year: 2019. The article elaborates under the advance of time, development of science and technology, and popularity of network, the combination of medical ecological environment and information & communication technology provides diverse medical care services for the public.

In spine movements, lower cervical spine is the largest part of movement as well as the most common part of spinal injury (as shown in Figure 1). The lower cervical spine fracture and dislocation is often accompanied by different degrees of spinal cord injury, namely the clinically common lower cervical spine fracture and dislocation associated with spinal cord injury combined (as shown in Figure 2). The incidence of this injury can lead to disorder of limb and trunk movement as well as sensory disorder. Since it is usually found in critical condition, which brings great difficulty for treatment. It has certain influences on the spinal cord function. More seriously, it may even be life-threatening (Wang 2015).

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and bone graft fusion combined with internal fixation(as shown in Figure 3), and posterior cervical decompression, reduction and internal fixation, and bone graft fusion between joints (as shown in Figure 4). There has been great dispute in the treatment effect of these two approaches. This study observed and explored the treatment effect of different approaches through grouping, and studied the method of selecting the best approach. The report content was as shown below (He et al. 2013).



Figure 1. Lower cervical spine fracture and injury

Source of figure: Wang Jianyuan. Analysis of the selection of the operation of lower cervical vertebra fracture and dislocation and curative effect. Xinjiang Medical University, 2015.

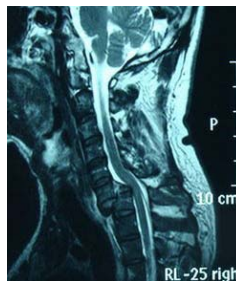


Figure 2. Pinal Cord Injury

Figure source: Cahill T, Chen XL, Lee JW, Weiss M, Chang VT, Cella D. Principles of radiofrequency ablation for cancer. Asian Pac J Surg Oncol 2015; 1(01): 47-58.



Figure 3. Postoperative anteroposterior and lateral cervical vertebra films

Figure source: He Baorong Xu Zhengwei, Hao Dingjun, Guohua. The anterior surgical treatment for lower cervical vertebra fracture and dislocation associated with spinal cord injury. Chinese Journal of Spine and Spinal Cord. 2013; 12 (07): 606-609.

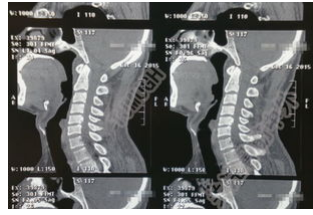


Figure 4. Posterior cervical decompression

Figure source: Ghoneum M, Felo N, Nwaogu OM, Fayanju IY, Jeffe JA, Margenthaler DB. Clinical Trials in Surgical Oncology. Asian Pac J Surg Oncol 2015; 1(02):73-82.

II Materials and Methods

General materials. The research objects of this study were 1200 cases of the patients with lower cervical vertebra fracture and dislocation associated with spinal cord injury. All of them had received treatment in the Hospital during the period from June 2012 to June 2016, and all of them were swimming athletes. They were diagnosed through receiving related clinical examination (imageological examination and laboratory examination). According to the standards of injury degree proposed by American Spinal Injury Association, 302 cases of patients had A-class injury; 208 cases had B-class injury; 456 cases had C-class injury; and 234 cases had D-class injury (Li et al. 2019).

All patients enjoyed the right to know the treatment. Random grouping was implemented. 600 patients performed with anterior cervical decompression, reduction and bone graft fusion combined with internal fixation were classified as group I. The other 600 patients receiving posterior cervical decompression, reduction and internal fixation, and bone graft fusion between joints were classified as group. Among them, group I had 325 female cases and 275 male cases. Their ages were between 18 and 32 years old, and their average age was 24.8 ± 1.1 years old. The period from when they were injured to when they were admitted to hospital was between one and four days, and the average period was 2.3 ± 0.7 days. The related data of these two groups of patients was comparable.

Methods. Treatment method of group I. Performance of anterior cervical decompression, reduction and bone graft fusion combined with internal fixation: after regular operation sterilization and draping, the patients took supine position. The anesthesia was general anaesthesia with tracheal intubation. For the patients with injury in less than two segments, vertical incision was performed on the part from the midline to the lateral border of the sternocleidomastoid; for the patients with injury in three or more segments, incision was performed on the anterior margin of the sternocleidomastoid; the subcutaneous tissue and the deep surface of neck platysma was separated, and the sternocleidomastoid was separated to anterior fascia. Then, the injured centrum was fully exposed, and lateral perspective positioning was performed with C-type arm X-ray machine (He et al. 2013); the injured centrum was distracted moderately to excise the intervertebral disc and the surrounding tissue was cleared; the injured centrum was eliminated until the endorhachis swelled, and then reduction of dislocation was implemented with distracto; autologous tricortical cortical iliac bone was placed in the decompressed space and traction was then performed; the remodeling steel plate for centrum was fixed, and it was further fixed after obtaining satisfactory result of strict inspection; the drainage tube was inserted into the incision which was then closed layer by layer (Yan et al. 2019).

Treatment method of Group II. Performance of posterior cervical decompression, reduction and internal fixation, and bone graft fusion between joints: after regular operation sterilization and draping, the patients took

prone position. The anesthesia was general anaesthesia with tracheal intubation. Incision was performed along the injured segments. Starting from the median part, the incision stretched towards the discontinued part of the spinous process, so that the part from the muscles and periosteum along the posterior vertebral column to the lateral border of the joints was fully exposed and the injured joints and vertebral plate were exposed; vertical traction was performed with towel to promote reduction of spinous process. Then, the effusion in the canalis vertebralis, ligament and bone fragments were thoroughly cleared to complete decompression; screw was implanted from the bevel angle by 30 degrees into the lateral part about 2mm to the midpoint, so that the screw was parallel to the articular surface of the joint. Then, fixation of connection was performed with molding connecting rod, and C-type arm X-ray machine was used to fix the steel plate; autologous tricortical cortical iliac bone was placed in the decompressed space and traction was then performed; after inserting the drainage tube, the incision was then closed layer by layer (Gu et al. 2015, Hayran et al. 2019).

Observation indicators. The following indicators of two groups of patients were observed and compared: operation time, wound diameter, intraoperative blood loss, hospital stay; Cobb angle, horizontal movement; condition of recovery of neurological function of spinal cord; condition of bone graft fusion.

Statistical method. This research adopted SPSS 21.0 statistical software for data processing. The counting data and the measurement data was respectively represented by (n, %) and ($\bar{x} \pm s$), and was respectively tested with chi-square and t test. If there is a statistically significant difference, $P < 0.05$.

III Results

Comparison on the related indicators of the operation situation of the two groups of patients. According to the statistics shown in table 1 below, there was no significant difference between the wound diameters of the two groups ($P > 0.05$); according to the comparison made between the two groups, the operation time, intraoperative blood loss, and hospital stay of Group I were obviously less than those of group II ($P < 0.05$).

Table 1. Condition of the comparison between the two groups on the related indicators of operation ($\bar{x} \pm s$)

Group	Operation tome (min)	Wound diameter (mm)	Blood loss	Hospital stay (days)
Group I (n=600)	76.8±10.8	32.4±7.6	175.8±45.8	34.5±4.3
Group II (n=600)	125.6±30.5	34.5±7.8	423.7±90.8	48.6±5.6
t	9.43	0.12	21.32	8.65
P	<0.05	>0.05	<0.05	<0.05

Condition of reduction of the dislocation of the two groups of patients. The Cobb angle, and horizontal movement of group I before and after the treatment respectively was (11.7±1.6) and (3.4±0.5) mm. Those of group II respectively was (11.2±1.5) and (3.5±0.5) mm; after treatment, Cobb angle and horizontal movement of group I respectively was (2.5±0.7) and (0.4±0.2) mm. Those of group II respectively was (2.4±0.8) and (0.5±0.3) mm. The above indicators of the two groups were all significantly better than those before treatment ($P < 0.05$). And there was no significant difference between the condition of dislocation reduction of the two groups before and after treatment ($P > 0.05$).

Comparison on the recovery condition of the neurological function of spinal cord. Evaluation on the condition of recovery of neurological function of spinal cord was carried out according to JOA scoring evaluation, and the related satisfactory rates of the two groups were as follows: for group I, there were 342 excellent cases (57.00%), 220 good cases (36.67%), 28 acceptable cases (4.67%), 10 bad cases (1.67%). Its

satisfactory rate was 93.67%; for group II, there were 325 excellent cases (54.17%), 232 good cases (38.67%), 20 acceptable cases (3.33%), and 23 bad cases (3.83%). Its satisfactory rate was 92.83%. There was no significant difference between the two groups ($P > 0.05$).

Comparison on the condition of bone graft fusion. After receiving treatment, both of the two groups of patients had satisfactory bone graft fusion condition with a bone graft fusion rate of 100.00%; the fusion time of group I was (11.83 ± 2.3), and that of group II was (16.74 ± 2.2) weeks. Group I had significantly shorter fusion time than II group ($P < 0.05$).

IV Discussion

As for the two commonly used treatment methods, namely anterior cervical decompression, reduction and bone graft fusion combined with internal fixation and posterior cervical decompression, reduction and internal fixation, and bone graft fusion between joints, this research respectively performed them on two groups of patients so as to observe their treatment effect. The results showed that both of those two methods had good treatment effect, and obtained good effect of reduction and bone graft fusion. After treatment, the JOA scores of the two groups were improved significantly, which suggested that they can obviously reduce the pressure on the spinal cord. The comparison on the condition of fracture dislocation reduction before and after treatment did not show significant difference, which suggested that both of the two methods had equal treatment effect.

V Conclusions

In conclusion, upon the incidence of lower cervical vertebra fracture and dislocation associated with spinal cord injury on the swimming athletes, both of the anterior bone graft fusion and the posterior bone graft fusion are able to obtain a relatively good treatment effect. As for the principle of selecting the approach, it depends on the actual part of spinal cord injury as well as the injury type.

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