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SURGICAL TACTICS IN THE CERVICAL SPINE INJURY TREATMENT

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ABSTRACT:

One of the most important surgical treatment stages of complicated cervical spine injuries, along with spinal cord adequate decompression, is the optimum damaged vertebral-motor segment stabilization. Getting reliable primary operated segment stabilization, allowing as soon as possible strengthening the patient without external immobilization, it is the primary goal of stabilizing stage surgery.

KEYWORDS: posttraumatic instability, granular "CollapAn", primary stabile arthrodesis.

INTRODUCTION:

The increase in road traffic injuries is accompanied by an increase in the injuries frequency to the cervical spine, possibly due to the seat belt negative role, which reduces the damage risk to the chest and head, but contributes to the flexion or "whiplash" injury mechanism to the cervical spine. If in the 60s of the last century, cervical spine injuries were mainly a "diver's" injury result, now the leading position belongs to a road accident [7, 12]. The reason for the neurological complications variety is the anatomical relationship peculiarities of the spine with the spinal cord, roots, and vertebral arteries. On this basis, some authors consider the term "uncomplicated" injuries of the cervical spine questionable [2, 10, 12]. The majority of traumatologists and neurosurgeons are convinced that only a surgical method can be used to achieve full decompression of the spinal cord and roots with reliable spine stabilization [11, 12]. Preference is given to operations from the anterior approach. This position has not always been recognized by clinicians. The widespread introduction into practice of the Cloward operation or its modifications has shown that this method is not without its drawbacks. Orthopedic complications (migration, bone grafts resorption, etc.) are not uncommon, they reach 25% even on the material of the operation author. The clinicians desire to modify the operation in accordance with the requirements for primary stable spinal fusion, allowing for early rehabilitation of patients, is understandable. To nowadays, various methods have been developed to stabilize the spine using metal structures [1, 6], ceramic-based implants [5, 9], composite materials [2, 4], titanium nickelide [3, 7, 8]. Without diminishing these methods advantages of spinal fusion, we note that the implants use does not exclude the late complications occurrence [7]. Our own experience in treating cervical vertebrae injuries allows us to assert that primary stable fusion is achievable without the metal or ceramics use and excludes the complications development specific to them.

MATERIAL AND METHODS:

This study was based on 135 patients' clinical observations who were treated in the period from 2002 to 2015. Most of the patients were young men (average age is 280. In 80% cases, the cervical spine injury was obtained in car accidents. In equal numbers of observations, a neck injury was stated both among patients using a seat belt and without it. A "diver"'s injury occurred in 12% cases, including 8% patients hospitalized before 2005. In the acute period of injury (up to 10 days), 63 patients were admitted, in the early period (up to 3 weeks) - 22 patients. Old injuries (more than 3 weeks) were recorded in 50 cases. Over the past 10 years, the chronic injuries proportion has significantly decreased (11 patients). This indicates an improved diagnosis this type of spinal injury. Vertebrae dislocations and subluxations were present in 90, fracture-dislocations - in 32, the vertebral bodies' fractures - in 13 patients. Neurological vertebrogenic syndromes were observed in 127 patients. In total, 80 patients had no clinical manifestations of spinal cord and root trauma. In most cases (81), the neurological picture corresponded to radicular syndrome, less often (46) - to myeloradiculopathy syndrome. We have not established clear clinical vertebral artery syndrome manifestations. However, 3 patients noted short-term consciousness loss followed by headache and nausea for 3-4 days. The vertebral arteries scanning carried out in these observations, excluded the blood disturbance flow in them and in the posterior cranial fossa.

According to Frankel's classification, the neurological complications severity in group B corresponded to 10, C - in 30, D - in 90, E - in 5 patients. All patients were operated on from the anterior approach. In the early and early period of injury, the dislocations and subluxations were repositioned using a reponator. In fractures case, the vertebral body resection was considered indicated up to complete replacement and transcorporeal decompression of the spinal cord with steno-spinal canal. To eliminate the vertebrae displacement in fracture-dislocations case in the acute and early periods, we have proposed a reponator that provides dosed distraction of the vertebrae and their movement relative to each other. In reposition failure case, the spinal cord and roots decompression was carried out by vertebral bodies' resection with the corresponding uncovertebral joints. We consider this operation as the choice method in the late injury period, since due to fibrous spine stabilization; repositions are dangerous due to possible iatrogenic complications. The operated spine segments stabilization was carried out with the biocomposite material "CollapAn". Bone cement was used to fix them in the vertebral bodies. The experiments carried out by us in 2002 on nabiomanikins showed that this fusion method meets the primarily stable fusion requirements. Spondylodesis was found to be effective under static and dynamic loads within the physiological loads parameters on the cervical spine. This made it possible to apply early rehabilitation of patients in the postoperative period without a plaster cast or orthosis. However, when using transport, we recommended that patients use a removable orthosis.

RESULTS AND DISCUSSION:

The spinal cord and roots decompression with primary-stable spinal fusion contributed to a high analgesic effect of the operation with an intense neurological syndromes regression. It is noted a typical feature of the neurological syndromes regression - a lower intensity and longer

duration of this process in patients with chronic injuries.

The average duration of the recovery period for neurological complications of chronic trauma was 60 days, with other complications - 25 days. 3 months after the operation, the neurological status assessment according to Frankel was as follows: B - no, C - 6, D - 5, E - 124 patients. Thus, with the surgical treatment help, it was possible to interrupt the neurological complications pathogenesis in most cases. Bone or bone-carbon block due to "CollapAn" was achieved in all patients.

At the same time, there was no difference in the bone block formation timing when using granular "Collapan". The average duration of bone block formation in one segment is 7 weeks, and for two segments, 11 weeks. Postoperative complications occurred in the initial work period. Spondylodesis failure with migration was noted in 9 cases. The reason for this complication is technical. The groove formation in the vertebrae was performed by electrophoresis, and the graft had a "siskin" shape. In the future, the grooves were formed manually with a graver, giving them a dovetail appearance. The graft was made with the supporting shoulders of the ulcer protrusions inserted into the vertebral bodies' grooves. When using this technology, there was no grafts migration. In the graft migration case, the patients were operated on again with a positive result. Neurological status deterioration in the immediate postoperative period was observed in 2 patients. This complication cause, in our opinion, is traumatic reduction, as well as vibration when using electrofresis for vertebral bodies' resection and grooves formation. This served as the basis for the electrophoresis rejection. Subsequently, the vertebrae resection and the grooves formation were performed manually with nippers and incisors, and the reposition was carried out without rough techniques and only once. If the reduction fails, we consider it safer to perform decompression of the spinal cord and roots by resecting the vertebral body. Wound suppuration was noted in 6 patients also in the initial work period. When mastering the anterior approach technique, the operations were performed traumatically and, possibly, with imperfect hemostasis. In addition to mastering the operation technique, wound suppuration became rare. Early treatment outcomes were assessed based on the following criteria:

- Analgesic effect of surgery;
- Regression of neurological syndromes;
- Reaching the bone block of damaged vertebral segments;
- Restoration of working capacity.

Good results were noted in 114, satisfactory - in 19, poor - in 2 patients. Long-term results with a follow-up of more than 5 years were followed in 12 patients. There was no overestimation of the treatment results. In all cases, a consistent bone block of damaged segments was established. However, 9 patients showed signs of discs degeneration located adjacent to the fusion level. We associate previously healthy discs degeneration with previous trauma and surgery, since fusion is accompanied by segments overloading adjacent to immobile ones. Despite the fact that patients have no clinical manifestations of osteochondrosis, we regard the healthy discs degeneration as a negative treatment result.

Obviously, this complication does not depend on the fusion method and a real measure of its prevention is the methods development for dynamic damaged vertebral segments stabilization.

Thus, the proposed surgical treatment tactics of cervical spine injuries, including spinal cord and roots decompression with primary stable fusion, provides a stable

positive result in most cases. Refusal to use metal structures for fusion allows avoiding the complications typical for them the late postoperative period and excluding the repeated operations possibility. A specific late complication of fusion is segments adjacent degeneration to the stabilization level due to compensatory overload. Probable prevention of this complication is the methods development for dynamic damaged vertebral segments stabilization.

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