

TREATMENT PRINCIPLES IN SPINAL FRACTURES DUE TO GUNSHOT WOUNDS

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ABSTRACT:

We evaluated retrospectively the results of 19 patients who had spinal fractures due to gunshot wounds in the Orthopaedics and Traumatology Department of Gülhane Military Medical Academy between January 1988 and May 1994. Average age of the patients was 23 and average follow-up was 2.5 years. The neurologic level in the spinal lesions might mismatch with the injury level in the spinal fractures due to gunshot wounds, since the thermal and blast effect of the missile could cause clinical perspective of approximately 5 centimeters proximal lesion level in these patients. While the early surgical stabilization and decompression have found succesful at the unstable spinal fractures, there is no indication of removal of foreign body inside the spinal canal in the patients with complete cord lesion. Since this kind of patients show motor, sensorial and autonomic dysfunctions, the treatment must cover all of these requirements with physical, psychological and rehabilitation components.

Key Words: Surgical treatment, spinal fracture, gunshot wound

Injuries due to gunshot wounds can be classified in three groups:

- a. Low velocity gunshot injuries
- b. High velocity gunshot injuries
- c. Close-range injuries.

Soft tissue damage is minimal in low velocity injuries. Extensive debridment is not required in this kind of injury caused by firearms like rifles and pistols. Infections is rare. Bone lesions are explained with direct effect and bone compression mechanism.

There is extensive soft tissue and bone necrosis in high velocity gunshot injuries. Wide excision is required, and generally the wound is left open or let to secondary closure. Direct and indirect effect is responsible in this kind of injuries.

Bone and soft tissue lesion is extensive in close-range injuries and usually the wound is left open. Gunshot wounds to the spine are usually caused by high velocity injuries. Usually bullet or bone fragment enters or retains inside the medullary canal. The problem is the unreparable damage of medullary elements. Shock treatment in initial admission, emergency treatment of life threatening other injuries, routine antibiotic-tetanus prophylaxis and steroid treatment against oedema formation are the milestones of treatment in this kind of injuries. Quadriplegia and paraplegia are among the early complications of medulla spinalis injuries (together with loss of sensation below the injury level) and osteomyelitis, posttraumatic syringomyelia, arachnoid cyst and cord adhesion and atrophy are among the late complications. Since injuries to medul-

la spinalis and vertebrae due to firearm injuries have different aspects according to the severity and effect, the treatment regiment should be multidisciplinary and in harmony with the severity of the lesions. Maintenance of early medullary decompression takes the priority in treatment.

If there happens persistant paraplegia after the initial injury, fixation and fusion is obligatory to prevent further neurologic deficit. Transpedicular hook and screw systems are developed for this purpose.

We observed that posterior fixation for maintaining the stability of vertebral colon after reduction and early mobilization make the rehabilitation of the patient easier in the postoperative period.

MATERIAL AND METHOD

We treated 19 patients with spinal fractures due to gunshot wounds surgically in Orthopaedics and Traumatology Department of Gülhane Military Medical Academy between 1988 and 1994. All of the patients were male and average age was 23 (range : 20-30). Average follow up period was 30 months (range : 6-72) 11 of the fractures were localized in thoracal area (57.8 %) and 8 were in lomber area (42.2 %) 5 of them had multible level fractures (73.7 %).

There were also perforated viscus in 8 of the cases (50 %). Indications for surgery were as follows:

Decompression and fragment removal in 5 cases, exploration and debridment in 1 case, worsening neurological status in 3 cases and stabilization in 10 cases.

While Frankel level progressed in 11 cases (57.8 %), Frankel stayed at the same level in 5 (26.3 %) and

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Frankel worsened in 3 of the cases (15.7 %). The infection was observed in 3 of the cases with perforated viscus (15.7 %).

These patients were treated with a combination of third generation cephalocyporine and gentamycine for 10 to 14 days. All the other patients were treated with crystallized penicilline and gentamycine combination and routine tetanus prophylaxis applied to the patients. There were no persistant infection.

Plain radiography, CT, MRI, EMG, detailed physical and neurological examination are used in the pre-operative assesment of the patients. Neurologic defisit level was not found compatible with the injury level in 13 patients (68.4 %) and neurologic level was found approximately 1 to 5 cm. higher than injury level. This was probably due to the blast and thermal effect of the bullet. The level was found same in 6 cases (31.7 %). We applied reduction and fixation with posterior hook and screw systems in 10 patients who had mild neurologic deficits but with unstable vertebral fractures since stabilization carries great importance in unstable fractures. We used a combination of autogenous and allograft for fusion. While the patients without perforated viscus but with unstable fractures were operated as soon as possible, we had to operate was 11.6 days (range 1-30 days) Laminectomy was usually applied together with the emergency operation. We applied it especially in case of narrowing of the upper lumbar canal.

Rehabilitation programme was began immediately after the application of rigid fixation for stabilization. No progression in neurologic deficit was observed during the average follow up period of 30 months.

RESULTS AND DISCUSSION

Spinal lesions due to gunshot wounds are not rare injuries. Since most of them happen as a result of high or low velocity injuries, usually an injury to abdominal or thoracic viscera accompanys to these injuries. Multible organ injury requires multidisciplinary treatment regiment. Life threatening viscera injuries and shock treatment always take the priority, thus postponing the treatment of spinal trauma.

The restoration of early stabilization, the achievement of vertebral colon mobility and anatomic restoration of the spinal canal within accaptable limits are the goals of spinal stabilization.

Surgical treatment of unstable fractures cause widening of spinal canal 35 percent if it is done in first week, and 25 % if it is done in second week. Widen-

ing of the spinal canal is not meaningfull if it is applied after the second week, so surgical treatment should be done earlier if it is aimed to widen the spinal canal. The real problem is irreparable damage to medullary neurologic elements. Satisfactory techniques and systems are present for fixation. Today's discussion is on the necessity of laminectomy in spinal fractures due to gunshot wounds. There are two opinions on this subject: No rapid return in functions could be seen with laminectomy. Commer Yashan et al. recommend laminectomy in rare conditions. They offer laminectomy immediately after injuries to spinal cord or spinal root, in case of incomplete progressive decrease of functions. Bone fragment or foreign material retained in the spinal canal, positive Queckenstadt's test, complete loss of motor and sensorial functions are not indications of laminectom. Bedbrook showed that spinal cord compression was not among the most common cause of irreversible injuries in the traumatic paralyzed patients, but the most important factor in cord lesion was crush - bending - rotational shear stresses. Bedbrook reported in his cadaver studies that neural damage was 1 to 5 cm. near the spinal injury level.

Disc fragments wllch happened after the posterosuperior fractures of vertebral body cause narrowing of the spinal canal with secondary canal compression. This event goes on with oedema and ischemia. Addition of infection would negatively effect the situation. It requires surgery if well localized heamatomyelia or compression cause damage in spinal cord. But this does not mean laminectomy.

Cord oedema after trauma could cause progressive or stationary paralysis. Cord compression or vascular occlusion especially in unstable thoracolumber fractures, causes thrombosis in intercostal or radicular artery. This situation is especially common between T10 and T11.

Malalignment of spinal canal could cause problems in arterial circulation between T4 and L2 thus early alignment is important in case of vascular occlusion. The alignment of spinal canal must be restored with early decompression in cases without total neurologic deficit in oder to prevent the progression of present neurologic deficit or occurrence of deficit. This situation is among the predictive factors to determinate the prognosis which is also necessary for early rehabilitation of the patients.

Early reduction and stabilization after ustable spinal fractures enable great utilities for mobilization and

rehabilitation. Besides the prevention of infection and treatment of accompanying lesions, continuation of rehabilitation efforts could only be possible with successful cooperation of related clinics.

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