

Acute Cervical Disc Disease

Volume: 06**Issue: 2S****December 1988****Page: 15-19**R W Cloward, - *Honolulu*

My experience, in treating cervical spine injuries, is probably greater than most people, because I live in an Island wherein favorite sports are in ocean, causing cervical spine injuries very frequently. Injuries occur in water sports during ocean diving or while being thrown to the beach by a big wave. When I went to medical school the treatment of broken neck was to tie the patient to a churney. Then the operator leans backwards and manipulates the neck to reduce the broken neck. In a patient with a comminuted fracture of cervical spine, to have the neck twisted, one can imagine what happens to the spinal cord! I am sure that the treatment did more harm than good. In 1935 Dr. Crutch-field came out with tongs. Depending on the nature of the injury, patients were put on skull traction - and hung up for 6 weeks to wait for the spine to heal and hopefully the spinal cord to improve. I have treated broken necks for almost 20 years by this technique and salvage rate of these young paralysed people was very small. The break through in cervical spine injury treatment came with the introduction of anterior approach to the cervical spine.

These injuries can be classified - according to the nature of the injury - as

- 1) Dislocation
- 2) Fractures.

They are two different entities, with a different pathophysiology and treatment. Majority of them are dislocation injuries. There may be fracture of the body and sometimes there can be fracture of the lamina and or pedicle along with it. Then occurs the dislocation or malalignment of the spine usually from a flexion injury. The vertical loading lesions fracture the body of the vertebra. One of the most common injuries is the acceleration injury. When the neck is turned into hyper extension, the disc gets lacerated, muscles of the neck and laryngeal cartilages may also be lacerated. Petechial hemorrhages often occur in the brain . Hyperflexion injury due to diving or striking a movable object does the opposite. Laceration of the disc and, tissues on the posterior aspect of the neck occur.

Whiplash injuries will have rigidity of lower spine due to muscle spasm. X-ray may not show anything. In a case of whiplash injury treated conservatively showed no improvement and had persistant neck pain. I did a discogram which revealed lacerated discs at 2 levels. After the operation the pain had completely subsided. We categorise these based on the severity of the dislocation. Wide interspinous space indicates interspinous ligament tear.

Transportation and immediate care is very important in these patients. We get the patients from the beach on an ambulance tied to a board (by trained people). A small wooden box was made by me with a tunnel underneath for AP view and a slot for the lateral X-rays. A sponge is kept under the neck in the emergency room. Pulling the shoulder down is a very important manoeuvre, otherwise fractures of the lower cervical spine may be missed completely. Shoulder in military position will show the lower cervical spines.

Pathology can be severe even though the X-ray looks simple in cervical spine injury. Malalignment with vertebrae above, or forward over the one below can occur. The spinal cord is compressed or pinched. This cuts off the venous drainage. Arterial bleeding into the spinal cord leads to haematomyelia. Post long ligament is often lacerated. Anterior longitudinal ligament is often intact. It is important to note that in many patients after reduction of the disc, the torn portion of disc is displaced into the spinal canal. If initial X-rays shows dislocation - skull tongs are applied with 25 pounds weight

for 25 mts and then a check X-ray is taken. Gardner Wells traction is easier to handle. Finally this opens up the disc space. Then putting the needle into the disc space a discogram is performed. Because the posterior longitudinal ligament is lacerated, the contrast enters the spinal canal, and the protusion is visualised very well in front of the spinal cord. Till then the patient will be in the emergency room. Then the patient is taken directly to OT and the disc piece taken out, by anterior approach by making a large drill hole in front of the vertebral body. The results are gratifying. We put the bone graft for fixation. Hawaiians are large people with big skeletons. So I prefer putting 2 holes and 2 grafts which make the joints much more stable. So, we remove the pathology, re-establish the alignment and fix the bodies with bone grafts. With laceration of anterior spinal ligament it can still be an unstable joint. Bone graft might slip off or move and give an angulation. We therefore do wiring of spinous process posteriorly, if there is any instability, by figure of eight wiring. Thus the unstable joint is secure both anteriorly and posteriorly. By reduction of the dislocation, decompression of the canal and fixation the patients are able to walk the very next day. I mobilize them early.

Severe contusion of the spinal cord, intra medullary damage and oedema are the changes that gives permanent impairment of function of the cord. To reduce the oedema we give steroids. In addition I put the patient in upright position. We want to drain oedema out of spinal cord by gravity from swollen tissue. In olden days traction and putting the patient in horizontal position, did not help in the return of function. We are protecting the cord by fixing and keeping in upright position to reduce oedema. Once oedema is decreased cord function will return rapidly.

An Indian male with rare congenital fusion at lower cervical spine - suffered a severe injury and became quadriplegic. Myelography showed a total block. He was paralysed for 7 months - I removed the lacerated disc and fused with bone graft. In a months time the boy could ride the bicycle.

Injury to the vertebral body by hyper-extension are usually seen in old people with spondylosis and osteophytosis. The cord get pinch leading to intra medullary haemorrhage and central cord syndrome. Haemorrhage in the center of the cord involves anterior horn cells, paralyses the arms but does not involve the pyramidal tracts. Patient may be able to walk. Mostly we treat them by putting on traction or brace and wait for the hemorrhage to dissolve or absorb. I do not wait, if the patient has any kind of pathology like large osteophytes or narrowing of spinal canal. Spinal cord is swollen and tight with blood inside. I want to give as much room as I can to the spinal cord. So, I operate on these patients immediately after the injury. I take out the osteophytes, widen the canal and fix the spine. Intra medullary haemorrhage will absorb and function will come back in almost every case.

Dislocation injuries in upper cervical spine cause the classical Hangmans fracture or traumatic spondylolisthesis of C2 over C3 due to fracture of pedicles. Mostly they were treated in hyper-extension in a brace or halo and wait for the nature to fuse. But I reduce these patients with traction and surgically remove the disc between C2 - C3 and put solid bone graft. Patients will recover from injury twice as fast as the nature could do it. Among the Hangman's fractures, 10% of cases had associated dislocation at lower cervical spine along with the fracture of C2. So if you see them in initial X-ray pull the shoulder down and look for an injury down at C6 - 7 or C7 - T1 regions. Different types of odontoid fractures were mentioned. They all heal spontaneously with brace. The fracture base of the odontoid is very unstable lesion and must be treated surgically and with brace. 70% of the odontoid fractures will heal spontaneously. If they do not heal posterior fusion has to be done. The fusion I do is by putting a wire between C1 and C2 but they frequently break. So I treat them by posterior fusion. If rib is removed very close to the spine it has a nice curve to accommodate between the cranium and cervical spine. We attach the rib to the base of the skull with wire and to the spinous process of C2 and then wire under the arch of atlas over the rib and give them a secure atlanto-axial joint. Results of 100 cases reviewed 10 years ago showed 53% of complete recovery - regardless of their pathology.

The other group of cervical spine injuries are the fractures. Water sports are typical examples for these. One moves at a speed of 60 miles per hour. Waves turn the head in flexed position and strikes his head to the sand in flexion. This produces vertical loading injury to cervical spine and fractures the body of vertebrae. This is divided into 3 categories depending on the severity of the fracture..

1. "Tear drop fracture" - small rim knocked off from the front of the body of the vertebrae.
2. More severe injury that break the piece off the body
3. "Crushing injury" of the vertebral body.

All these involves anterior part of the vertebral body. The posterior 3rd of the vertebra is usually intact. They are compression fractures.

In a burst fracture of the entire vertebral body the posterior part is also involved. First I operated anteriorly and I put a graft above and below this fracture. The bone grafts thus placed were very slow in healing. When they finally heal, there may be more angulation of the spine. The reason is that, the vertebra, which is squashed, has very poor blood supply. So, for the graft also the blood supply is inadequate and take long time to heal. Then we got a better idea. Our indication for surgery is to remove the spinal pathology that may be encroaching upon the cord causing pressure and impairment of circulation due to malalignment of spine and intra spinal disc protrusion. In these fractures especially compression fracture the body of the vertebra is always projected backwards and the spinal cord is compressed by the solid bone. I would like to get the bone out as soon as possible. Technique is to remove the disc above and below and by using a ronger remove all broken bone leaving an isthmus of bone. Then pass the wire around the isthmus above and below making a seat for bone graft. To restore the space small bone grafts are put into the defect. A wire is passed through it and secured by twisting it.

If it is necessary to remove the posterior part of the vertebral body in burst fractures, we secure the graft anteriorly by wiring. We use gas sterilised cadaver bone grafts.

We had a 23 year old man from Canada who came with quadraplegia. Using skull tongs same day the fracture vertebra was removed - small isthmus was left for wiring and graft was put. Spine restored normal alignment. In two weeks time he went back to Canada. Ten days after surgery he started moving and had a rapid recovery. He had no sensations or movement before surgery.

Another 14 year old girl who dived into a shallow pool sustained compression fracture and became totally quadreplegic. Two vertebral bodies were removed and a long graft was placed. There was posterior dislocation of the bodies, narrowing the spinal canal. People questioned why to operate on a totally quadreplegic. But, we are aware that fully transected cord at the moment of impact can never get voluntary function in lower extremities. I am trying to save a nerve root or two, at the level of the injury. Since it is middle of cervical cord injury, nerve roots above can control the hands and fingers. One can give a quadreplegic a functional hand, so that he can take care of himself. If he loses anterior horn cells at the level of the injury he is a hopeless cripple. I think we are doing great service to these by getting the spinal cord free and the circulation back, so that many other functions of the hand are saved.

I feel a laminectomy for cervical injury is indicated only in fractured laminae invades the cord posteriorly. But to perform laminectomy with the idea of decompressing the cord, is not fruitful and should not be done. It does no good, but does more harm. One should attack the pathology always.

Anaesthesia

Quadreplegics have paralysed chest muscles, so have impaired breathing. They can only breathe with diaphragm. The anaesthetist puts endotracheal tube and next day the patient will have lot of secretions and can develop hypostatic pneumonia. The endotracheal tube can rub up and down inside the larynx, produce hemorrhages and cause excess of mucus formation. All these can lead to problems. A few cases I did under local anaesthesia. Next day the trachea was dry and there was no problem.

Out of 25 compression fractures operated, only one died. None of the total quadreplegics made a complete recovery. Only 5 were able to walk and this, I consider, is a very good service.

Message to spine surgeons who treat broken necks

Do not be timid about these injuries. There is nothing we can do about the intramedullary damage to the cord. I am sure neurosurgeons have gone through the years thinking of the interior of the cord. But once should think about the outside of the cord. In my experience there is much greater pathology outside to cause quadraparesis than the intramedullary damage. But if you remove the pathology that is outside the dura, compressing the cord and impairing circulation, straighten up the angulation of spine, fix the spine, these patients will have much better opportunity to live than being hopeless cripples.