

COMPLICATIONS OF CERVICAL SPINE SURGERY

INTRA-OPERATIVE COMPLICATIONS

Positioning

Positioning many patients with cervical spine abnormalities requires close supervision by the surgeon. Sometimes fibre optic intubation is the safest method particularly in patients who are of high risk or have a cervical spine fracture. In the supine position a head ring will be used and your head will be secured to the bed using Elastoplast tape. In the prone position when operating on the back of the neck a three prong Mayfield clamp will be used to position the head. Foot pumps are used in both procedures to try and decrease the risk of a deep vein thrombosis. Pressure on any of the extremities or pressure around the head also is carefully monitored. Hyperextension of the neck which can cause further core compression is also closely monitored and avoided at all times. If traction is used the amount of traction considered, especially in patients who have trauma or where there is chronic spinal compression is measured very carefully.

Approach related – Anterior

The anterior approach to the cervical spine was popularised by Smith, Robinson and many others. It is the standard approach that I use to get to the front of someone's neck when performing multiple different procedures. Care has to be taken as there have been reported cases of damage to the carotid artery, the jugular vein and the oesophagus (food pipe). If there is damage to your oesophagus any tears must be identified and then repaired. This will be done at the time of your operation if recognised. You will also have a nasogastric tube inserted. Nervous structures that are susceptible to injury during the anterior approach include the recurrent laryngeal nerve which controls one of the major parts of your vocal box, the superior laryngeal nerve, the sympathetic chain and for approaches which are at the top of your cervical spine the twelfth cranial nerve. The commonest nerve to be injured is the recurrent laryngeal nerve and this may lead to hoarseness in your voice which can be transient or can be permanent. The superior laryngeal nerve if injured can lead to voice fatigue and may be a problem if the patient is a professional singer. Sympathetic chain is located lateral to one of the muscles and usually isn't seen in the Smith, Robinson approach. If this is damaged this may cause a Horner's syndrome whereby there is loss of sweating and droopy eyelids to one side of the face. For approaches to the very upper cervical spine the 12th or hyper glossal nerve may be damaged.

Approach related – Posterior

When the posterior approach is performed there is a large amount of stripping of the muscles from the back of the spinous processes. Vertebral arteries

which run in a canal lateral to the spinal cord itself in the vertebral bodies may be injured. For that reason dissection more lateral than 2cms at the C1/2 level is avoided. If this is injured it may require exposure and repair or ligation to control the bleeding. Also stripping of the C2 spinous process can result in late kyphosis.

Decompression Related - Anterior

The most severe and at times irreversible complication of cervical spine surgeon is injury to the spinal cord itself or the nerve root injury. This can be from direct bruising, traction, vascular complications or any combinations of the above. Many of my patients who require anterior decompressive surgery have had severe spinal cord compression for some time. I take extra care in these patients as their cord is very sensitive to manipulation around the dura that lines the spinal cord itself. This includes changes in blood pressure. For this part of the procedure I always use an operating microscope to give maximal illumination and safety. I do not usually use anti-inflammatory steroids routinely in patients as there has been no controlled randomized trials that suggest that this decreases the risk to the patient.

Nerve root injury is also uncommon as a spinal cord injury but has been described after anterior decompression. This relates either to direct or indirect manipulation or traction of the nerve root while the overlying piece of offending disc or bone is removed. I use a high speed burr to thin the out bridgings of bone from the joints and then gently lift them off the ligament or the nerve root to avoid direct damage to the nerve.

The major vascular structure at risk in anterior decompression is the vertebral artery. I try and leave a lateral shell of bone on each side of the vertebrae several millimetres thick to prevent injury to the artery itself. This allows adequate neural decompression. Sometimes in people who have tumours in their neck this is obviously a lot more difficult to identify and in these patients there is a higher risk of damage to this particular structure. If it is injured then direct repair will be attempted otherwise ligation and control of bleeding will be undertaken.

Leakage of the cerebral spinal fluid (CSF) may occur from damage to the dura. Sometimes this is unrecognised at the time of surgery. A direct repair using 6 or 7.0 nylon sutures is my preferable treatment. Gel foam also can be used to stop the leak.

Another undesirable consequence of anterior decompression is inadequate removal of the compressive agent.

Decompression related posterior

Direct trauma to the spinal cord or nerve roots must be avoided. Extremely good lightening microscopic illumination are techniques that I use to try and

avoid this. Reports in the literature have indicated that a fifth cervical nerve root can occur with laminoplasty procedures. This is because of a stretch injury to the nerve as the spinal cords expand posteriorly as the compressive elements are removed. Usually this recovers. CSF leak is uncommon but also a possibility. When a laminectomy is performed posteriorly if more than 50% of the facet joints are removed then there is a chance of late kyphosis development. This is why it is important to attend follow-up clinic appointments and flexion extension films will be obtained during the course of post operative management.

Early post operative complications

Upper airway obstruction from swelling or bleeding from both the anterior and posterior decompression procedures have been reported. I use a drain for all cervical spine procedures and for all anterior approaches my patients will spend the first night in the Intensive Care Unit. Depending upon the difficulty my Anaesthetist had intubating you, you may have your breathing tube left in for 24 hours. My Anaesthetist will advise on the management of your airway post-op.

Transient difficulties swallowing is a common occurrence after anterior cervical spine surgery and it is related to retracting the food pipe out of the way or post operative swelling. This usually resolves in the first couple of days however it may take longer. This will usually completely resolve within six to twelve weeks. If there is a delayed presentation of neurological deficit then the main question is whether there is expanding haematoma. If this is the case then urgent MRI scan will be obtained and a further surgical procedure may be necessary to drain the blood clot from your neck. I also avoid giving Aspirin or any other chemical anticoagulation therapy and anti inflammatory drugs post operatively. I use early mobilisation and mechanical devices such as foot or calf compression pumps to minimise the risk of DVT.

Post operative infection is an unusual complication after cervical spine surgery perhaps because of the high vascular supply to this area. I use pre operative antibiotics. Dislodged grafts, cages or plates may erode into the oesophagus and can result in local infection or inflammation of the mediastinum, this may be life threatening. Draining and antibiotics will be required.

Bone graft related complications

If a bone graft is used from your hip this may include a graft fracture or dislodgement. The vertebral body may fracture and the donor site may cause problems including infection and on going irritation. It is very unusual for the graft to move in anyway shape or form. If at the time of surgery I feel that it is necessary a plate will also be used. Complications of insertion of plate are of course loosening, penetration of vascular or neurological objects and eroding into the oesophagus as previously mentioned. If your graft did collapse there

is a chance that a kyphosis or anterior angulation deformity may develop in your cervical spine. I use a tricortical graft to avoid this situation. However in older patients or patients with osteoporosis this graft may subside into the vertebral body or fracture the vertebral body.

In posterior procedures bone grafting complications are rare. If required I will fuse the facet joints and may or may not use implants to support this.

Frequency of bone graft site complications from the hip varies. On many occasions I now use an implant such as a cage that fits between the vertebrae with artificial bone graft substitute that will form a fusion block between the two vertebrae. This is occasionally supported with a plate. Complications of the bone graft site include chronic pain, bleeding, haematoma, damage to the lateral femoral cutaneous nerve and subsequent neurapraxia and numbness.

Stabilisation of instrumentation complications

Anterior plating of the cervical spine for use in trauma, patients with tumour or degenerative conditions is common in my practice. When I use instrumentation there is always a risk of malposition of the instrumentation, breakage or migration of the implant. Part of the risk depends on the quality of the bone of the patient and obviously in older patients who may have lost their porosis this is a more likely complication. In certain situations I may use bicortical fixation in the vertebral body however because of the risk of damage to the dura or the spinal cord itself I do not routinely do this. I use a locking type plate device and this has dramatically decreased the amount of pull outs as reported in the literature.

Posterior stabilisation is quite commonly used plates, screws, wires or mitek suture anchors to hold open a laminectomy site. Lateral mass plating has the complication of possible damage to nerve roots or vertebral artery. In nearly all cervical spine cases I use a soft collar or a Philadelphia collar post op. If I am concerned about stability a halo vest may be employed.

Late Complications

Pseudoarthrosis is the commonest late complication of cervical fusion. That is defined as a failure of fusion of the particular part of the cervical spine you have had your surgery on. Not all reports in the literature suggest that pseudoarthrosis actually compromises the overall result and I often find the patients who do have a non union are asymptomatic. The risk of pseudoarthrosis increases with the number of levels fused, it is uncommon in my practice for one level pseudoarthroses to develop. On going x-ray follow-up is important to try and assess the development of this.

Kyphosis may result from discectomy without fusion and it is far less common in those cases that I fuse. I do not do a discectomy without fusion.

Adjacent levels

Late problems at adjacent levels may occur to on going normal degenerative processes. Some studies have suggested that either side of the fusion the extra stress is distributed evenly throughout the cervical spine. It is very important to have on going follow up and attend post op clinic appointments to ensure that observation of these adjacent levels and stability is maintained.

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