

## COMPLICATIONS OF ANTERIOR APPROACH TO THE CERVICAL SPINE\*

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### ABSTRACT :

Since 1984, 12 cases has been seen as a complication of anterior approach to the cervical spine in 267 consecutive patients were reviewed. There were 134 (50.2%) men and 133 (49.8%) women; their ages ranges from 17 to 73 years. Their pathologies were herniated disc, trauma and tumor. Among these 267 patients, 178 (66.6%) modified Cloward technique, 58 (21.7%) Cloward technique and 31 (11.7%) vertebrectomy were performed. Overall complication rate was 4.49 percent. Most common complications were bone graft slippage (2.24%) or fracture (0.75%) which could be easily diagnosed by plain x-ray. Overall infection rate was 1.49 percent. Wound infection of donor site was seen in 2 patients (0.75%), bony infection of the primary operative site in one (0.37%) and retropharyngeal abscess in one (0.37%). One patient (0.37%) had postoperative transient Horner's syndrome resolving within three days. Eight patients (2.99%) underwent reoperation in the early or late postoperative period for graft slippage and graft fracture. The results of reoperations were successful.

**Key Words:** complications, cervical spine, anterior.

### INTRODUCTION

Complications from anterior cervical spinal surgery include injury to any of the tissue expose in the operative field (6). Hemorrhage and infection, disruption or thrombosis of the vascular structure, injury to trachea, pleura, esophagus, recurrent laryngeal nerve, sympathetic chain, spinal nerve roots and spinal cord, and either donor site or bone graft related complications can be seen (1, 2, 3, 4, 6, 7, 8, 9, 10, 12, 13). Complication rates ranges from 0 to 13 percent in different series (1, 2, 4, 7, 8, 9, 10). This article reports our experience of complications secondary anterior approach to the cervical spine in 267 patients.

### MATERIAL AND METHOD

Anterior cervical approaches were performed in 267 consecutive patients at our department since 1985. Among these patients, 134 of them (50.2%) were men and 133 (49.8%) were women. The average age was 45.3 years, ranging from 17 to 73 years.

Among these 267 patients, 178 (66.4%) modified Cloward technique, 58 (21.7%) Cloward technique and 31 (11.9%) vertebrectomy were performed. Pathologies included herniated disc with or without myelopathy, trauma and tumor. Plain x-ray was performed

for preoperative and postoperative evaluation in all cases. Computerized tomography or magnetic resonance imaging were used for diagnosis routinely since 1988 and 1991 respectively.

All patients were operated on in supine position under general enesthesia. An approach from right side was preferred with a collar incision from the midline to the anterior border of sternocleidomastoid muscle. Upon opening the skin, usual technical consideration was applied. Proper level was verified with the help of C-armed scope in the operating room. Operating microscope was used routinely. If necessary, high speed diamond drill was used besides sharp curets. Autologous bone graft from the iliac crest was always used except in the case with metastatic carcinoma.

Stabilizing technique with foreign implant was needed in 5 patients (1.87%). In 2 patients with neuroinoma and metastase, locking plate plus autologous bone graft and locking plate plus methyl-metacrylate were used respectively. Only locking plate was used in 2 patients who had traumatic corpus compression fracture plus dislocation and one had graft slippage after Cloward operation for herniated cervical disc.

In modified Cloward technique, cervical fusion was performed with bone screw. After the cylindrical graft is obtained from iliac crest, it is placed into the compression threading device which is manually operated. The compression device immediately form sharp and firm threads on the surface of the graft. After the

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depth adjustable diestock is introduced in order to thread the receiving bed, the graft is inserted by pushing gently and screwing.

## RESULTS

Among 267 patients who were operated on via anterior approach, 12 (4.49%) of them had various complications. Most common complications related to bone graft in our serie. Graft slippage occurred in 6 patients (2.25%) who were operated on with Cloward technique (in 5 cases) or vertebrectomy (in one cases). Graft slippage did not occur in modified Cloward technique. Additional bony infection was developed in one patient with graft slippage. Graft fracture in 2 patients (0.75%) who were operated on with Cloward technique. Additional bony infection was developed in one patient with graft slippage. Graft fracture in 2 patients (0.75%) who were operated on with Cloward technique. Reoperation was needed in 8 (2.99%) patients with bone graft complication. Among them, additional locking plate implantation was needed in one case who was operated on two times for graft slippage. One patient with traumatic C 5-6 dislocation who had been treated with halo traction system in another center, was admitted to our department with redislocation. After modified Cloward technique was performed, he was discharged with only collar. No complication was observed in follow-up.

Wound infection of donor site was seen in 2 patients (0.75%). Bony infection of the primary operative site developed in one (0.37%) and retropharyngeal abscess in one (0.37%). Surgical drainage was performed in patients with donor site infection and retropharyngeal abscess. The patient with bony infection and graft slippage treated with antibiotics plus external immobilization with cervical collar prior to reoperation. The overall infection rate was (1.49%). One patient (0.37%) had transient Horner's syndrome resolving within three days. All patients suffered pain in donor site that gradually reduced within a month. In the early postoperative period, slight difficulty in swallowing and sensation of a lump in the throat was observed in most of the cases. The other reported complications due to anterior approach to the cervical spine was not seen in our serie.

## DISCUSSION

Retraction-related problems are the most common form of postoperative morbidity, and result in laryngeal edema, hoarseness, dysphagia, or a sensation of a

lump in the throat (6, 7, 11, 12). The recurrent laryngeal nerve lies in the fascial plane between trachea and esophagus. It is slightly more vulnerable to injury on the right side because its shorter course (1, 6, 7). Vocal cord palsy is apparent after an anterior operation in about 2 percent of cases. It is transient in most cases (resolving within weeks) and permanent in a few (7). In the early postoperative period, slight difficulty in swallowing and sensation of a lump in the throat was observed in most of the cases in our serie. Postoperative complaints of dysphagia and a sensation of a lump in the throat can be minimalized by avoiding prolonged and excessive retraction on the midline structures. Should these retraction-related prolonged and excessive retraction on the midline structures. Should these retraction-related problems arise a short course of steroid therapy has been found useful (12). We only use the nonsteroid antiinflammatory drugs to reducing these complaints. Occasionally, emergency tracheostomy has been necessary because of upper airway obstruction secondary to extensive retraction. In our serie non of the patients needed tracheostomy. Reflex bradycardia during operation or postoperative transient Horner's syndrome may be seen related to retraction of the carotid artery or sympathetic chain respectively (3, 6). In our study, reflex bradycardia was observed in only few patients and Horner's syndrome in one.

Injury to the carotid artery is rare during operations on the anterior cervical spine. It is result in cerebral ischemia secondary to excessive compression of the carotid artery by retraction, (decreasing in blood flow, or shedding of the intravascular emboli (particularly in older patients with vascular disease), or thrombosis due to excessive distortion and intimal injury), or the vertebral artery dissection into the cervical canal (7, 9, 10, 11, 13). Cerebral ischemia due to injury to the vascular structure was not seen in our cases.

Hemorrhage from injured carotid artery during neck dissection or meticulous placement of the Cloward retractor blades is rare but life-threatening complication (11, 12). These problems can be avoided by appropriate neck dissection and meticulous placement of the Cloward retractor blades beneath the medial aspect of the longus colli muscles. We modified the Cloward retractor by flattening of the tip. Modification in the tip of the Cloward retractor blades is of importance to avoid injury to carotid artery and midline structures. Hemorrhage from carotid artery was not occurred in our cases.

Hemorrhage from the disc space is due to injury to the bone (injury to the vertebral body with the disc space spreader) or epidural veins (11). In the majority of our cases the bleeding could easily be controlled by using bone-wax or gentle pressure.

Severe hemorrhage due to insufficient hemostasis may cause tracheal distortion and air-way obstruction in the early postoperative period (6, 7, 11, 12). These problems can be avoided primarily careful hemostasis during the operation and careful observation in the early postoperative period. Some authors believed that the routine use of a drain upon wound closure will decrease the chance for a wound hematoma causing difficulty with breathing.

Hemorrhage can occur approximately 1 percent of cases despite carefully performed operation under optimal condition (7). Although, these rates can be decreased less than 1 percent by using modern microsurgical technique and bipolar cauter. In addition, usage of modified Cloward retractor is important to avoid life-threatening hemorrhage due to injury of carotid artery.

Esophageal and tracheal perforation are retraction-related complication that can be presented by using the blades inproperly. If these complications occur and are recognized, these should be repaired immediately. Fusion under these circumstances is contraindicated. Failure to treat perforation of these structure appropriately may result in a fistula, airway problem, or osteomyelitis in the operative site. Tracheal and esophageal complications are unusual (2, 6, 7, 11, 12). In our serie, injury to esophagus or trachea did not happen.

Root and cord signs can be increased regardless of the approach. Quadriplegia may result frm cord injury, and root signs and symptoms may be exacerbated. The risk of neurological deficits increasing after operation is about 5 percent overall (2, 3, 6, 7, 11, 12, 13). There was no increased neurological defisit after surgery in this study. To avoid injury to the spinal cord and the nerve roots, routine manipulatin within the cervical canal should be minimalized. Coagulation with only bipolar cauter and carefull placement of the bone graft are important t avoid injury t the neural structure.

Slippage or fracture of the bone graft can be expected in a small number of cases (5, 6, 7, 11, 12). Immediate postoperative verification should be performed by lateral x-ray of the cervical spine. If severe dysphagia develops in the early postoperative period, migration of the bone graft is probably occured and

lateral x-ray of the cervical spine should be repeated. In the late postoperative period, these complications may occur. Sudden onset f neck pain, radiculopathy or dysphagie in the late postoperative period suggests the complicatins above, and should be checked by lateral x-ray in order to rule out the complications due to bone graft. These were demonstrated either in routine early postoperative control or after the onset of neck pain, radicular symptoms or dysphagia in the late postoperative control or after the onset of neck pain, radicular symptoms or dysphagia in the late postoperative period. Diagnosis of bone graft complications necessiates reoperation. The reoperative cases in which exploration of the neck and slippaged or fractured bone graft removal can be difficult, and a larger bone graft is necessary. In these circumstances, complications due to anterior approach to the cervical spine and in donor site may increase. In our study, graft fracture was seen in 2 patients and graft slippage in 6. Slippage or fracture of the bone graft was not seen in modified Cloward technique. Advantages of this technique are superior resistance to pressure, greater fixation power, larger contact surface, facilitating fusion formation and better stabilization (5).

Postoperative infection rate is reported approximately 1 percent in the literature (6, 7, 11, 12). The rate of postoperative infection in the primary operative site less than 1 percent in our study. This may be due to restricted usage of foreign implants.

Donor site complications such as injury to the lateral femoral cutaneous nerve, pain, iliac wing fracture, and postoperative wound infection can be seen (6, 7, 9, 10, 11, 12, 13). Only pain (in most of the cases) and wound infection (0.75%) was seen in this study. Pain resolved within a month in our cases. These can be minimized by proper incision site, gentle dissection, restricted use of electrocautery, meticulous hemostasis.

In conclusion, to avoid complications of anterior approach to the cervical spine; besides usage of modern microsurgical technique, modified Cloward technique and modification in Cloward retractor blades is recommended, autologous bone graft should be preferred and routine foreign implants usage should be restricted in benign cervical disease.

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