

## Short Communications

# Enlarged approach to the anterior cervical spine

G. SUCCO, M.D., A. SOLINI, M.D.\*, E. CROSETTI, M.D., G. GARGIULO, M.D.\*, A. SARTORIS, M.D., F.A.C.S.

### Abstract

In this report a new enlarged approach to the anterior cervical spine is presented. A 66-year-old female, having a large C3-C4-C5 chordoma, recurrent after surgery and following radiotherapy, underwent a surgical resection.

The approach allows a wide retraction of the nasopharynx, oropharynx and larynx from the midline, only sacrificing the superior laryngeal nerve on one side.

Its continuity can be re-established later by adopting the stent in tube technique. The approach we used presents all the risks of infection common in trans-oral approaches. For this reason, closure of the pharynx in two layers must be meticulous and watertight and re-inforced by using a myofascial sternocleidomastoid flap, according to the trachoesophageal fistula closure technique. A correct alignment of the tongue, the pre-plating of the mandible and the correct suture of the vermillion border guarantee excellent cosmetic and functional results.

**Key words:** Surgical Procedures, Operative; Cervical Vertebrae

### Introduction

In this report a new enlarged approach to the anterior cervical spine is presented. This was obtained by Trotter's<sup>1</sup> median labiomandibular tongue splitting extended distally through McAfee's approach.<sup>2</sup> A wide exposure of the anterior cervical spine is obtained, from the clivus to C7, without any vascular or nervous barrier, providing control of both vertebral arteries. Our report concerns one patient, having a large C3-C4-C5 chordoma, recurrent after surgery and following high energy radiation therapy.

### Case report

A 66-year-old woman was admitted to the Orthopaedic Department with a diagnosis of recurrent chordoma involving the C3-C5 areas. The patient had previously been operated on in the same department 42 months before using a right McAfee's approach.<sup>2</sup> Post-operatively the patient had received a cycle of high energy radiation therapy using proton beams and had remained asymptomatic for three years. She later developed progressive cervical contracture, cervico-brachialgia, with left radicular palsy along C3 and C6, soft pyramidal lower limb signs (Babinsky and lower limb clonus) and progressive swallowing impairment. Clinical examination showed a multilobulated irregular retropharyngeal mass, extending from the right lateral and posterior oropharyngeal wall to the hypopharynx. Behind the right tonsillar fossa, it was possible to see a deep mucosal ulceration, (1 cm), showing the superior part of the synthesis plate. Cranial nerve deficits were absent. The patient complained of a loss of weight of 4 kg and a Karnowsky index of 60. Both lateral

and anterior cervical spine films, showed erosion of the C3-C4-C5 bodies and anterior displacement of the titanium plate (Figure 1). Magnetic resonance imaging (MRI) in the sagittal plane clearly revealed the tumour, determining anterior compression of the spinal cord (Figure 2). In the axial plane, partial involvement of the transversarium foramina of the IV cervical level, was revealed. Selective carotid and vertebral angiograms showed no vertebral artery displacement. The mass was less avascular. The patient underwent a second operation, described here, after percutaneous endoscopic gastrostomy (PEG) in order to keep the pharynx free. A cervical collar was provided to support the spine for the first six months post-operatively. Neither infections nor cranial nerve palsy were observed. Videofluoroscopic examination was performed on the 14th post-operative day and showed no fistulae, a decreased laryngeal elevation and hypopharynx fixity which caused slow food transit. Persistent stanching of wet and semisolid food followed post-swallowing aspiration. After tracheal cannula replacement by a stoma stent, speech therapy was initiated so as to achieve complete swallowing restoration 67 days post-operatively. The patient's left arm palsy improved and no other symptoms were revealed, 22 months later. She is now able to walk unaided and to eat using her left hand. Figure 3 shows the cervical spine X-ray, after excision of the tumour mass. The aesthetic results are also good (Figure 4–5).

### Surgical procedure

The patient was placed in a supine position and her neck carefully extended. During the operation the spinal cord

From the Department of ENT I, University of Turin, Italy and the Orthopaedic Department\*, Azienda Ospedaliera San Giovanni Battista, Turin, Italy.

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FIG. 1

Cervical spine X-ray: erosion of the C3-C4-C5 bodies and displacement of the titanium plate.

function was monitored through cortically recorded somatosensory evoked potentials. Tracheostomy was performed using local anaesthesia. After this the patient was given general anaesthesia. The previous T-shaped right submandibular incision was once again taken. Identification and dissection of the main points of McAfee's approach were very difficult due to the previous operation and following radiation therapy. The marginal mandibular branch of the facial nerve, the carotid sheath with the stump of sectioned superior thyroid artery, the hypoglossal, superior and inferior laryngeal nerves were identified in sequence. A supraomohyoid neck dissection (level 1→3) was performed in order to improve exposure. The specimen was found negative for lymph node metastases at frozen section. The digastric and stylohyoid muscles were then divided but the medial retraction of the hyoid bone and pharynx was impossible, due to the intense sclerotic scarring process. The plate was clearly palpable through the mouth, pushing through the neck at the same time. We therefore decided to increase the exposure obtained by a median labio-mandibular-glossotomy in order to: 1) avoid irregular wounds of the pharyngeal wall, difficult to repair afterwards; 2) show the upper extremity of the tumour; 3) retract the nasopharynx, oropharynx and larynx from the midline to dominate both vertebral arteries. The neck incision was extended vertically, splitting the lower lip and the chin and exposing the anterior surface of the mandible. The angled fashion

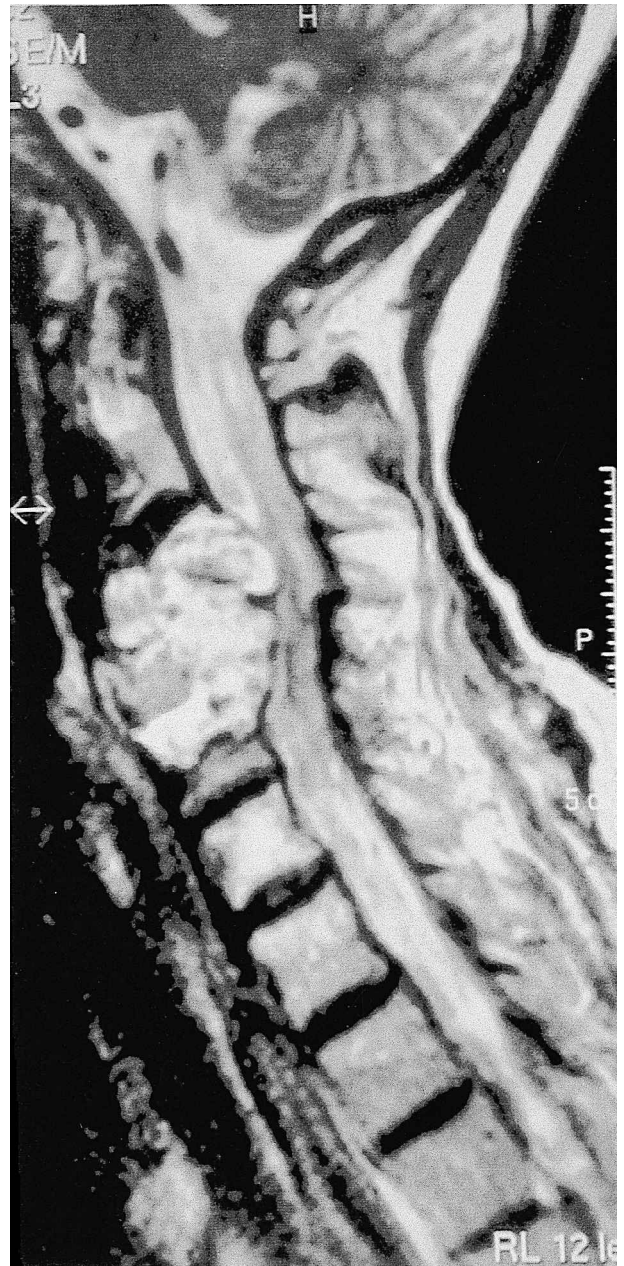


FIG. 2

Cervical MRI (sagittal plane): anterior compression of the spinal cord.

mandibulotomy was performed between the central incisors. Pre-plating was done with two four-hole titanium miniplates. The floor of the mouth, frenulum of the tongue and the entire tongue is bisected in the midline from its tip down to the hyoid bone and the glosso-epiglottic fold. At this point a full thickness pharyngotomy along the right glosso-epiglottic vallecula was carried out. Incision was extended vertically to the nasopharynx, making a J-shaped left flap (Figure 6). The incision ran along the external side of the plate. After this the pharyngeal wall and the pharyngeal muscles were detached. The superior laryngeal nerve was then sectioned, using the stent in tube technique, in order to restore continuity at the end of the operation. The pharynx, the larynx, the oesophagus and the left hemimandible were then located by the midline thus obtaining excellent vision of the anterior cervical spine without traction (Figure 7). The pharyngeal muscles



FIG. 3  
Post-operative cervical spine X-ray.

were found free to the frozen sections. Tumour extension went from C3 to C5 also partially covering the C2 and C6 bodies. After having removed the plate, we then proceeded under microscopic vision to complete removal of the tumour (necessarily performed intralesionally) and exposure of the dural sac. Removal was completed with a high speed drill so as to expose the healthy bone of C2 and C6. The cervical spine was stabilized by means of a tricortical iliac graft, fashioned in a titanium mesh, and using a bridge plate fixed to the mesh and C2/C6 bodies.



FIG. 4  
Aesthetic result: the appearance of the patient six months following surgery.

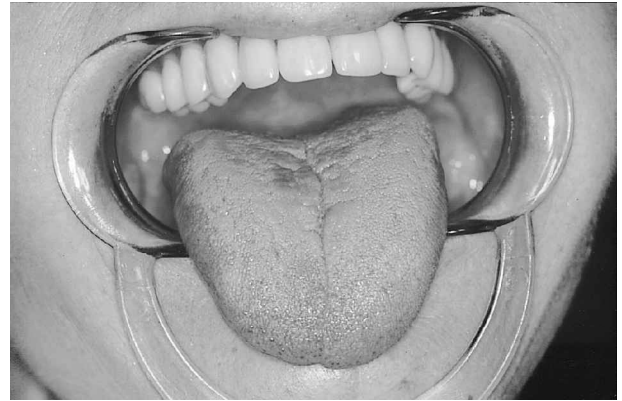


FIG. 5  
Aesthetic result; intraoral view showing accurate re-approximation of the tongue.

The following phase was very delicate since pharyngotomy and the salivary fistula could cause infections of the bone graft. After having detached the occipitomastoideal and clavicular insertions and carefully preserved the XIth cranial nerve, the sternocleidomastoid (SCM) muscle was re-routed and its upper portion was sutured to the prevertebral fascia in order to cover the mesh. Haemostasis was secured by bipolar cauterization and bone wax. The posterolateral pharyngotomy was closed with two layers of 2/0 Vicryl interrupted sutures. The glossotomy was closed in three layers of interrupted 2/0 Vicryl sutures, allowing meticulous alignment of the dorsum of the tongue, as well as the floor of the mouth. The mandibulotomy was repaired using two four-hole miniplates and screws. The hyoid-laryngo-tracheal complex was re-connected to the suprahyoid musculature using Vicryl 1/10 sutures. The two stumps of the tube containing superior laryngeal nerves were sutured with two stitches of nylon 7/0 and cricopharyngeal muscle myotomy was carried out.

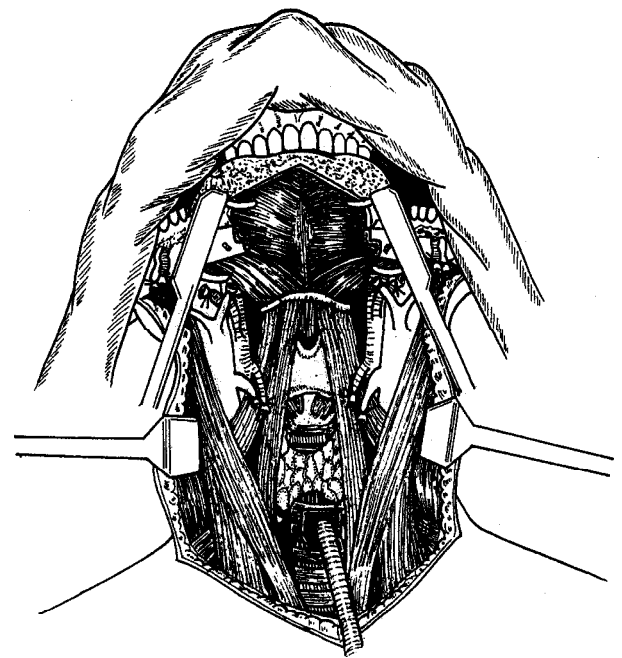


FIG. 6  
The floor of the mouth and the tongue are divided in the midline to the hyoid bone.

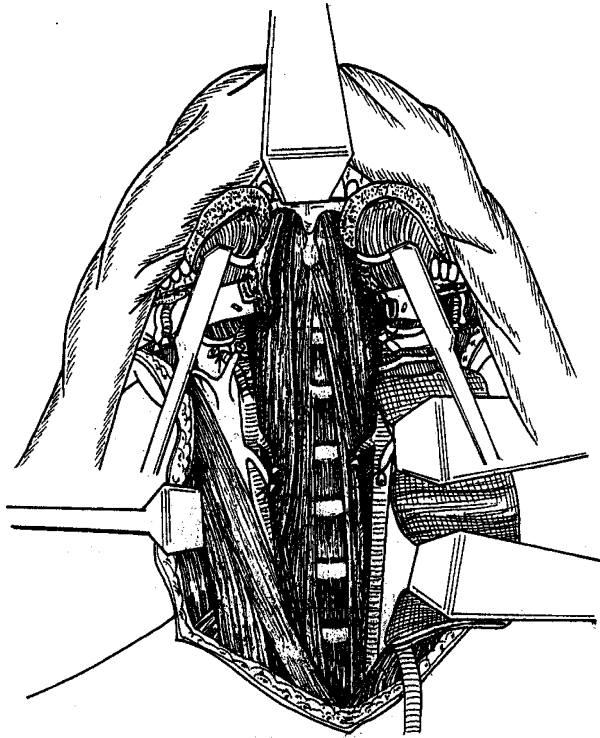


FIG. 7

Excellent vision of the anterior cervical spine is obtained by the dislocation of the pharynx, larynx, oesophagus and left hemi-mandible.

### Discussion

Chordomas are tumours with poor prognosis, as demonstrated in several reports.<sup>2-4</sup> Death is usually caused by local recurrence of tumour.<sup>5</sup> Two main surgical approaches are commonly used for resecting chordomas of the upper cervical spine; the extra-oral cervical approach and the trans-oral approach. The cervical approach may be medial (McAfee's technique<sup>2</sup>) or lateral (Whiteside and Kelly's technique<sup>6</sup>) to the carotid sheath. The advantage of using the extra-oral approach is the reduction of the infective complications. On the contrary the intra-oral approach reveals a high percentage of post-operative infections.<sup>7</sup> We normally use McAfee's retropharyngeal approach, which provides good control of the cervical spine (from the clivus to C7) and of both vertebral arteries.

We rarely use the transoral route, only for the monobloc resection of small chordomas of the cranio-cervical region that do not extend inferiorly to C3. This consists of median labiomandibular glossectomy.<sup>8</sup> In this case, it was not possible to proceed according to the anterior retropharyngeal route, so we put the above mentioned techniques together, thus obtaining a great exposure of the cervical spine without barriers. We could also have exposed the lesion by Biller-Krespi's transmandibular technique,<sup>9</sup> where the transoral section passes in the lateral floor of the mouth. However, there would have been three nervous trunks dividing the dissection field: the lingual nerve (which is normally sectioned), the hypoglossal nerve and the superior laryngeal nerve. Their presence would have

impeded a good dislocation of the laryngoesophageal complex. Furthermore, a prolonged traction of these nerves may cause neurapraxia which often proves definitive. By using our approach only the superior laryngeal nerve on one side is sacrificed. Its continuity can be re-established by adopting the stent in tube technique. The approach we used presents all the infective risks common in the trans-oral approaches.<sup>5,7</sup> For this reason closure of the pharynx in two layers must be meticulous and watertight. When the prevertebral muscles are resected, re-inforcing closure and covering of the graft is obtained by using a myofascial SCM flap, according to the tracheo-oesophageal fistula closure technique.<sup>10</sup> A correct alignment of the tongue, the pre-plating of the mandible and the correct suture of the vermillion border guarantee excellent cosmetic and functional results. This technique must be limited to selected cases, when no other extra-oral options are possible. Dysphagia may be considered important, as in this case. The role of functional rehabilitation is important, as also is pneumoencephalography (PEG) and cricopharyngeal myotomy.

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Address for correspondence:  
Giovanni Succo, M.D.,  
I Clinica Otorinolaringoiatrica,  
Università di Torino,  
Via Genova n° 3, 10126 Torino, Italy.

Fax: 39-11-6963541  
E-mail: giovannisucco@hotmail.com

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