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From less to maximally invasiveness in cervical spine surgery A "nightmare" case who deserve consideration

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ABSTRACT

INTRODUCTION: Multilevel cervical myelopathy without surgical treatment is generally poor in the neurological deficit without surgical decompression. The two main surgical strategies used for the treatment of multilevel cervical myelopathy are anterior decompression via anterior corpectomy or posterior decompression via laminctomy/laminoplasty.
PRESENTATION OF CASE: We present the case of a 62 year-old lady, harboring rheumatoid artritis (RA) with gait disturbances, pain, and weakness in both arms. A C5 and C6 somatectomy, C4–C7 discectomy and, instrumentation and fusion with telescopic distractor "piston like", anterior plate and expandable screws were performed. Two days later the patient complained dysfagia, and a cervical X-ray showed hardware dislocation. So a C4 somatectomy, telescopic extension of the construct up to C3 with expandible screws was performed. After one week the patient complained again soft dysfagia. New cervical X-ray showed the pull out of the cranial screws (C3). So the third surgery "one stage combined" an anterior decompression with fusion along with posterior instrumentation, and fusion was performed.
DISCUSSION: There is a considerable controversy over which surgical approach will receive the best clinical outcome for the minimum cost in the compressive cervical myelopathy. However, the most important factors in patient selection for a particular procedure are the clinical symptoms and the radiographic alignment of the spine. the goals of surgery for cervical multilevel stenosis include the restoration of height, alignment, and stability.
CONCLUSION: We stress the importance of a careful patients selection, and invocated still the importance for 360° cervical fixation.
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1. Introduction

Multilevel cervical myelopathy (MCM) is frequently related to a spondytic stenosis or to the ossification of the posterior longitudinal ligament at multiple cervical levels but can be also associated to inflammatory diseases as rheumatoid artritis (RA) [1,2]. The natural course of MCM without surgical treatment is generally poor, but a stabilization of neurological deficits or even recovery may be obtained in majority of patients through surgical decompression. The two main surgical strategies used for the treatment of MCM are anterior decompression via anterior corpectomy or posterior decompression via laminectomy/laminoplasty. However, there is considerable controversy on which surgical approach will provide the best clinical result with the minimum cost. The presence of cervical kyphosis leads many surgeons to recommend an anterior approach in order to obtain the best neural decompression along with stabilization and fusion [1]. Nevertheless, although this approach allows thorough decompression, a sufficient anterior stabilization after decompressive procedures extending over 3 or more disc levels can be difficult to achieve [1,2]. Multilevel corpectomies are associated with a 10–50% incidence of graft dislodgement [3]; given the complications associated with isolated anterior surgery, many surgeons recommend combined anterior and posterior surgical procedures for patients with multilevel cervical stenosis, especially in the presence of substantial kyphosis (Figs. 1 and 2).

2. Case report

We present the case of a 62 year-old lady, harboring rheumatoid artritis (RA) since 4 years. Due to an accidental fall the patient complained neck pain and gait disturbances along with pain and weakness at both arms starting respectively two and one years before. At the admission (June 2006) she presented hyposthenia in both arms mainly at the interosseous muscles, spastic gait, hyperreflexia at lower and upper extremities, with multidirectional oscillation at Romberg test. A cervical spine MR showed

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Fig. 1. MR sagittal T2 W (left upper) and axial (left lower) and CT scan (right upper) and axial (right lower) showing a cervical spine MR along with CT scans showed a C5 and C6, C6 and C7 spinal canal stenosis with radiological sign of cervical myelopathy and impingement of CSF anterior film.

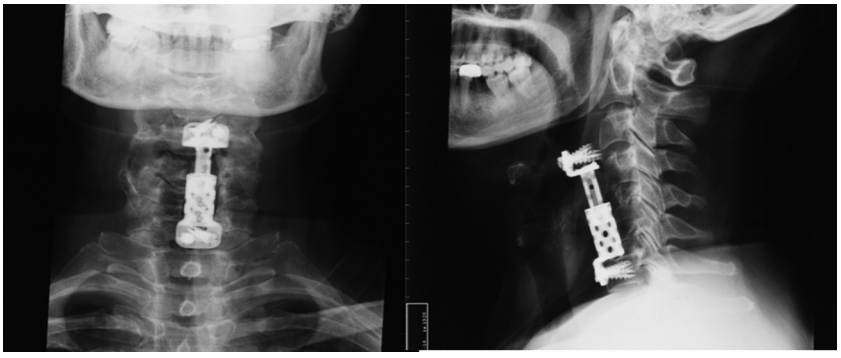

Fig. 2. Cervical X-ray performed two days after the first operation due to dysfagia, showing: AP (left) and LL (right), the superior hardware dislocation, the pull out of the cranial screws and the removal of C4 body.

C5-C6, C6-C7 spinal canal stenosis more evident at right site with radiological sign of MCM and impingement of cerebrospinal fluid anterior film. No cervical spine instability was evident at dynamic X-ray. Somatosensory evoked potentials (SSEP) showed a reduction of N13 wave on both sides, suggesting a C6–C7 cord grey matter suffering pattern. A C5–C6 somatectomy, C4–C7 discectomy and, instrumentation and fusion with telescopic distractor "piston like", anterior plate and expandable screws (Ulrich) was performed with a minimally invasive hardware. We obtained an excellent intraoperative fluoroscopy in the operating room. The

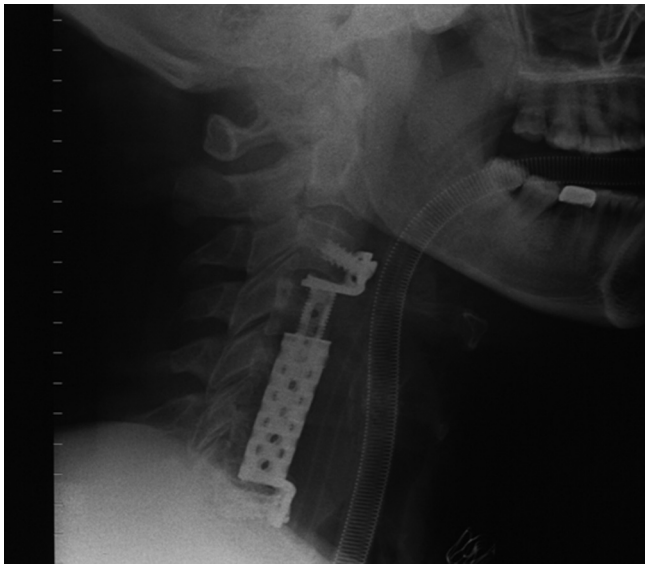

Fig. 3. The excellent intraoperative X-ray control during the second operation consisting of C4 somatectomy, telescopic extension of the construct up to C3.

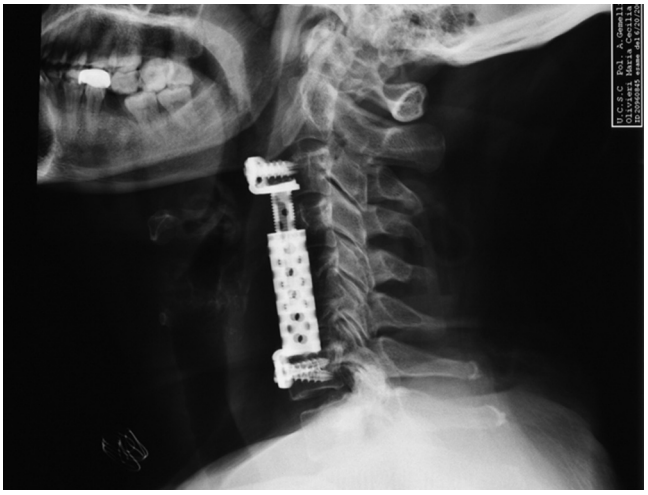

Fig. 4. X-ray performed one week 1 after first operation (the patient complained against dysfagia) showing superior hardware dislocation (pull out the cranial screws with anterior removal of C3 body).

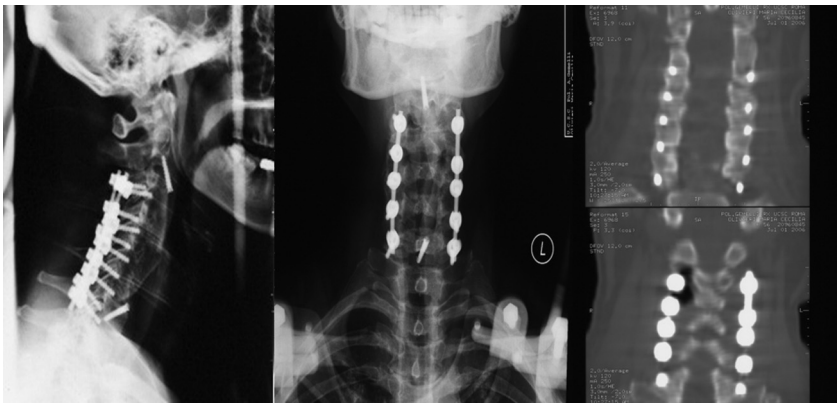

Fig. 5. X-ray lateral (left) and AP (center) and CT scan coronal ((right) after third surgery "one stage combined" an anterior decompression with fusion along with posterior instrumentation with C3–C7 lateral masses screws and rods. De Puy Spine USA) was performed.

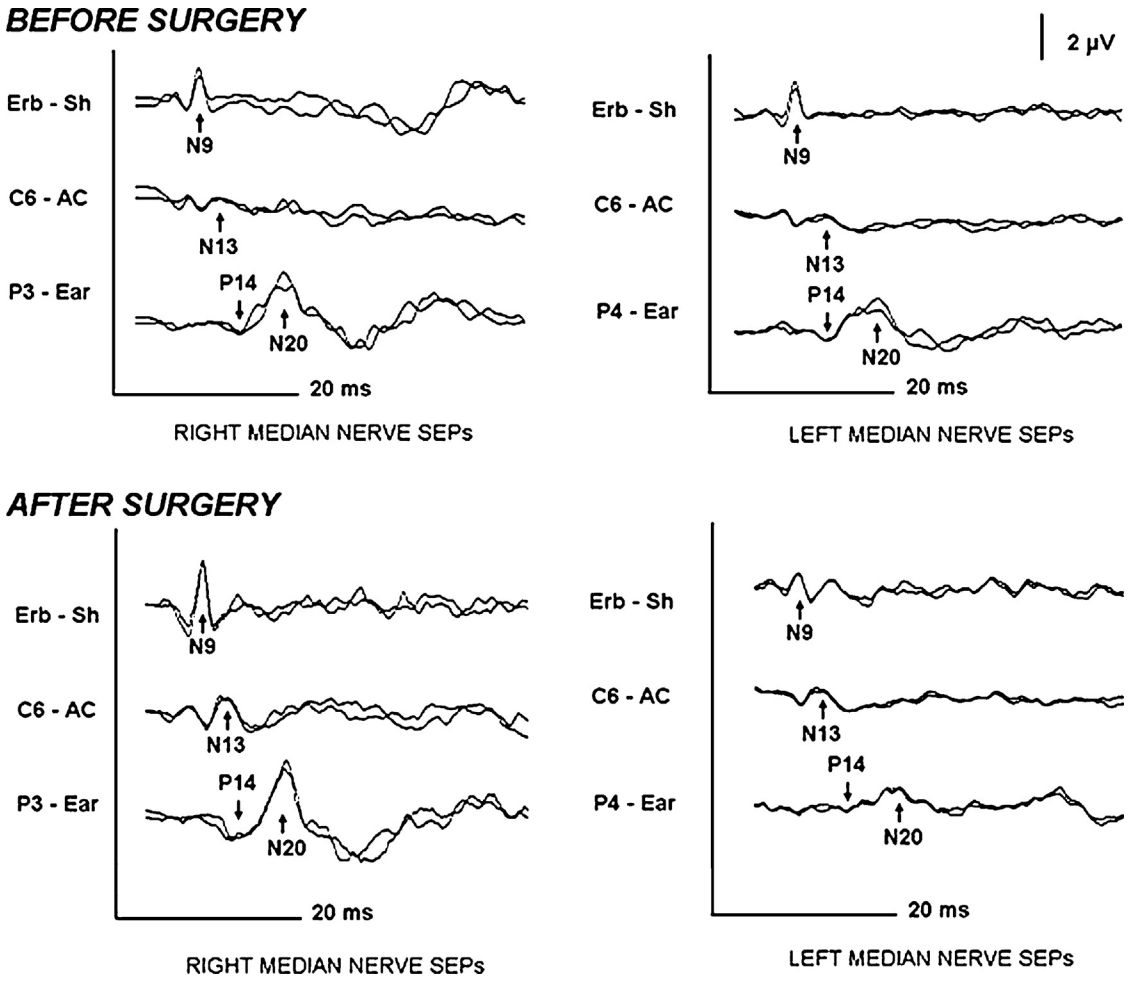

Fig. 6. Preoperative SSEP shows a reduction of N13 on both sides, suggesting a C6 and C7 cord gray matter suffering pattern (upper). Postoperative SSEP demonstrates an increase in N13 on both sides suggesting metabolic improvement of C6 and C7 cord gray matter.

patient, returned to the ward with Shantz collar. Two days later the patient complained dysfagia, and a cervical X-ray showed the hardware dislocation (pull out the cranial screws with destruction of C4 body). Consequently a second operation was performed consisting of C4 somatectomy, telescopic extension of the construct up to C3 with expandible screws, immediately confirmed by an excellent intraoperative X-ray study. The postoperative course was uneventful with a good clinical improvement. After one week the patient again complained soft dysfagia. X-ray assessment showed the pull out of the cranial screws (C3) with further destruction of C3 body. A third surgery "one stage combined" an anterior decompression with fusion and posterior instrumentation and fusion (C2–C7 autograftwith anterior screws, posterior instrumentation with C3–C7 lateral masses screws and rods) was performed. The patient was again fixed with Halo for 4 months and, subsequently, with Shantz collar for one week. Three months after surgery SSEP

were improved, clinical status and neuroradiological assessment confirmed a full recovery which showed a stable pattern in the following years up to date (Figs. 3 and 4,).

3. Discussion

The most important factors in patient selection for spine surgery are the relevance of the clinical symptoms and the evidence of compression and the lack of the radiographic alignment of the spine. An appropriate patient selection maximizes the chance of optimal neurological recovery and minimizes the complications. Beside the decompression of the neural elements, the goals of spine surgery include decompression, restoration of height, alignment and stability. In patients with kyphotic angulation, and in patients with disease at the cervico thoracic junction, achieving these goals can be challenging [4]. Actually there is no a unique consensus regarding indications for anterior, posterior, or combined surgical approaches. After anterior cervical decompression, various methods of interbody grafting have been used, with or without anterior plate placement or posterior instrumentation. Complication rate of cervical corpectomy with fusion include instrument failure, graft extrusion, pseudoarthrosis, subsidence, and fusion failure. Sasso et al. [4] reported that fusion failure was 9% in cases involving fewer than 2 levels and 50% in cases involving more than 3 levels. Further, Vaccaro et al. [5] reported that fusion failure was 6% in those involving more than 2 levels and 71% in those involving more than 3 levels. The telescopic plate spacer is a stand-alone device designed to facilitate spinal fixation after corpectomy at the cervical or upper thoracic spine; it permits the restoration of height, lordosis, and vertebral alignment by providing in-line distraction. In our opinion, the main disadvantage of this system is the absence of a load control during the implantation on the cervical spine. In fact, an extension traction on the cervical spine is necessary to fit the system into the corpectomy site, the system requires a in-situ manual distraction, and the fluoroscopy is the only intraoperative control available, but it does not take into account the real axial load in the cervical spine. In our case, despite implants engaged the edge of the vertebral bodies, we observed the dislocation of the upper expandable screws. So we speculate that our system failure is due to changes in the axial load and in the original intraoperative extension of the cervical spine occurring during patient mobilization after surgery. This theory is confirmed by the third surgery where after the posterior stabilization a best stability of the cervical spine was reached with no system failure and progressive improvement of patient's symptoms. Moreover, in our case this device appears, manifestly, too rigid for a frail bone (the bone density could have been checked before surgery) (Figs. 5 and 6,).

As matter of fact, rare reports exists emphasizing the use of telescopic system as a unique stabilization device. More in details in few mechanical tests in animal models comparing commercially available anterior cervical plates and telescopic devices, it was shown that the telescopic devices outperformed the anterior cervical plates in all modalities except for torsion stiffness and tension-bending failure load. In those studies fusion occurred in 100% of the subject with the telescopic devices and in 70% only with the conventional ones [6].

4. Conclusion

Although the telescopic devices can be used to restore height, alignment and stability after corpectomy up to three levels, they need to be used carefully in patients with bone weakness, avoiding hyperextension of the neck, preferably associated with posterior fusion (360° cervical fixation).

Conflicts of interest

No conflicts of interest.

Sources of funding

No sources of funding.

Ethical approval

We have the approval from "Università Cattolica del Sacro Cuore" of Rome.

Consent

We have the signed consent from the patient.

Author's contribution

M. Visocchi MD: study concept, interpretation, data analysis.
G. Conforti MD: writing the paper, data analysis.
G.M. Della Pepa MD: collection data.
G. La Rocca MD: collection data.
A. Spallone MD: inte pretation.

Guarantor

Giulio Conforti MD.

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