Cervicothoracic junction disc herniation: Our experience, technical remarks, and outcome

ABSTRACT
Background: C7-D1 disc herniation is rare in comparison with other cervical levels. The incidence rates have been reported between 3.5% and 8%.[1-8] Typically, it is demonstrated clinically by C8 radiculalgia. The latter births in the neck and radiates in the little finger. There is also a referred pain in the scapular region. Sensory loss is in the medial forearm and the sensation of pinky and ring finger is affected too. The muscles particularly affected include abductor pollicis brevis (pulmar abduction of the thumb), first dorsal interossei (abduction of the index), and abductor digit minimi (abduction of the little finger).[9-13] The cervicothoracic junction can be approached posteriorly or anteriorly. While the anterior approach to cervical spine is very familiar to spine surgeons, but C7-T1 anterior cervical discectomy can be challenging because of the difficulty of access resulted from the manubrium in particular among patients with the short and deep neck. The posterior approach can be challenging in particular in medial disc herniation because of difficulty to access to hernia and inability to reflect the spinal cord. Concerning C7-T1 cervical discectomy, few data are available in the literature. In this article, we aim to present our experience with cervicothoracic junction disc herniation (C7-T1) surgery, describe our approaches.

Materials and Methods: Between January 2008 and December 2017, 21 patients have been operated for solitary C7-T1 disc herniation. We operated 12 male patients and 9 female patients. Eight patients have been operated by the anterior approach, and 13 patients underwent surgery by the posterior approach. The mean symptoms duration was 11.4 months.

Results: All patients had C8 cervicobrachial neuralgia. Other clinical presentations were numbness, tingling sensation, and weakness. All patients improved after surgery. We had no significant complication.

Conclusion: We did not find a great difference between the clinical features of cervicothoracic herniated disc and other cervical levels. The anterior approach seems more difficult to carry out in particularly in large patients with the short neck. The posterior approach can be used for all types of patients except in the case of medial disc herniation.

Keywords: Anterior cervical approach, cervicothoracic spine, disc herniation, posterior cervical approach

INTRODUCTION
C7-D1 disc herniation is rare in comparison with other cervical levels. The incidence rates have been reported between 3.5% and 8%.[1-8] Typically, it is demonstrated clinically by C8 radiculalgia. The latter births in the neck and radiates in the little finger. There is also a referred pain in the scapular region. Sensory loss is in the medial forearm and the sensation of pinky and ring finger is affected too. The muscles particularly affected include abductor pollicis brevis (pulmar abduction of the thumb), first dorsal interossei (abduction of the index), and abductor digit minimi (abduction of the little finger).[9-13] The cervicothoracic junction can be approached posteriorly or anteriorly. While the anterior approach to cervical spine is very familiar to spine surgeons, but C7-T1 anterior cervical discectomy can be challenging because of the difficulty of access resulted from the manubrium in particular among patients with the short and deep neck. The posterior approach can also be challenging in particular in medial disc herniation because of difficulty to access to hernia and inability to reflect the spinal cord. Concerning C7-T1 cervical discectomy, few data are available in the literature. In this article, we aim to present our experience with cervicothoracic junction disc herniation (C7-T1) surgery, describe our approaches,

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the reason of each approach, and propose some surgical
remarks.

Surgical anatomy of the cervicothoracic junction
The cervicothoracic junction is formed by the manubrium
anteriorly, the first ribs laterally, and the vertebral body of
T1 posteriorly. The sternocleidomastoid (SCM) muscle inserts
the sternum. The latter is covered by the platysma muscle.
The sternohyoid and sternothyroid muscles attach to sternum
too and are deeper compared to the SCM. Vascular structures
of the region contain a terminal portion of the subclavian
vein, right brachiocephalic, left subclavian, and left internal
arteries. Nervous structures include the internal jugular vein,
the common carotid artery, the vague nerve, the phrenic
nerve, recurrent laryngeal nerve, and stellate ganglia. The
internal organs passing through the cervicothoracic junction
include the thoracic duct, trachea, and esophagus.8–10,16–19

MATERIALS AND METHODS

Between January 2008 and December 2017, 21 patients
have been operated for solitary C7-T1 disc herniation. We
operated 12 male patients and 9 female patients (female/
male ratio = 1/1.33). The mean symptoms duration
was 11.4 months. All patients had cervicobrachial
neuralgia (radiculalgia and cervical pain). Patients with
cervical myelopathy were excluded from the study. Eight
patients have been operated by the anterior approach and
13 patients underwent surgery by the posterior approach.
The posterior approach involved simple discectomy and
anterior approach consisted of total discectomy and fusion
by the intersomatic cage. The average length of stay in
hospitals was 2 days. Four patients were discharged the day
after surgery, and one patient stayed 3 days in the hospital
for family-related reasons. Table 1 demonstrates the patients’
baseline and characteristics.

Patients wore cervical collar a few days after surgery used
for reducing pain and avoiding too much cervical movement.
Patients operated by the anterior approach underwent X-ray
imaging (anteroposterior and lateral cervical spine) of the
cervical spine on the day after surgery, week 6, months 6,
year 1, and year 2 postoperatively. Patients operated by
the posterior approach had X-ray imaging one and 2 years
after surgery. All patients were examined clinically at 6 and
12 weeks, 6 months, 1 year, and 2 years postoperatively
and evaluated with a Visual Analog Scale (VAS) ranging from
0 (no pain) to 10 (worst pain imaginable) and with the Neck
Disability Index (NDI), which ranges from 0 to 50 (0%–100%).
The mean duration of follow-up was 3.7 years.

RESULTS

The results were evaluated for pain with VAS, for ability, and
to manage in everyday life by NDI. Table 2 demonstrates the
pre- and postoperative evaluation of patients by VAS and NDI.

DISCUSSION

The indication of the posterior or anterior approach for
the treatment of upper cervical radiculopathy is well
reported in the medical literature.2,18,19 Classically, the
posterior approach is indicated for the treatment of
lateral disc herniation or foraminal stenosis. The anterior
approach is used for the treatment of central osteophytes
or disc herniation. Some authors consider that anterior
approach and fusion by intersomatic cage can provide
improvement in the cervical lordosis angle.20–23 However,
this notion is insufficiently clear and probably implausible
in cervicothoracic junction because of reduced mobility
of the region and because of the existence of sternum. On
the other hand, the existence of recurrent laryngeal nerve,
stellate ganglia, and the thoracic duct, etc., make this specific
anatomical site hard to access and obscure the surgical field.
We did not find a significant change in cervical lordosis in
patients operated by the anterior or posterior approach
in cervicothoracic junction. The danger of the anterior
approach in this region is injury to the subclavian vein, the
recurrent laryngeal nerve, and the thoracic duct and great
vessel.2,18 For the cervicothoracic posterior approach, the
same complications associated with any type of cervical
surgery (cord and root injury). We operated 9 females and
12 males, resulting in a final ratio of 1.33/1 versus 2/1 in the
literature for cervical disc herniation.24,25 The mean age of
our patients was 52.34. This is in close agreement with the
results from the medical literature that gives an average age of
around 50 years.26,27 We operated eight patients by anterior
and 13 patients with the posterior approach. For the anterior
approach, we used a transverse incision except for one
patient that we performed an oblique longitudinal incision
because of his expansive corpulence and his very short neck.
No sternotomy was performed in any patient operated by
the anterior approach. For the posterior approach, a 3- or
4-cm paramedian skin incision is made centered over the
involved segment. Needless to say, while it is recommended
to preserve facet joint,28,29 we think that the preservation
of the facet joint is not indispensable unlike other cervical
levels because the maintaining of stability is easier given the

Table 1: Patients’ baseline and characteristics

| Patients | Age | Female | Male | AA | PA |
|----------|-----|--------|------|----|----|
| 21       | 41-67 (52.34) | 9 | 12 | 8 | 13 |

AA - Anterior approach; PA - Posterior approach
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Table 2: Pre- and postoperative Visual Analog Scale and Neck Disability Index

|                  | Preoperative | Postoperative 6 weeks | Postoperative 6 months | Postoperative 1 year | Postoperative 2 years |
|------------------|--------------|------------------------|------------------------|----------------------|-----------------------|
|                  | VAS | NDI | VAS | NDI | VAS | NDI | VAS | NDI | VAS | NDI | VAS | NDI |
| PA               |    |    |    |    |    |    |    |    |    |    |    |    |
|                  | 7.69| 71.22 | 3.99 | 42.44 | 1.95 | 31.05 | 2.01 | 29.76 | 1.89 | 24.34 |
| AA               |    |    |    |    |    |    |    |    |    |    |    |    |
|                  | 8.01| 74.12 | 4.01 | 39.34 | 3.19 | 32.83 | 1.89 | 19.97 | 1.96 | 21.32 |

VAS - Visual Analog Scale; NDI - Neck Disability Index; PA - Posterior approach; AA - Anterior approach

Table 2: Comparison of clinical outcomes in anterior cervical discectomy versus posterior cervical foraminotomy at C5–C6: the biomechanical changes after percutaneous full-endoscopic anterior cervical Discectomy versus posterior cervical foraminotomy at C5-C6: A finite element-based study. World Neurosurg 2019;128:e905-e911.

CONCLUSION

Following our experience of 21 surgeries for C7-T1 disc herniation, we believe that there is no great difference between the clinical features of cervicothoracic herniated disc and other cervical levels. The anterior approach seems more difficult to carry out in particular in large patients with the short neck. The posterior approach can be used for all types of patients except in the case of medial disc herniation.

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Conflicts of interest

There are no conflicts of interest.

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