Transmanubrial Approach to the Cervicothoracic Junction Pathology

- Manubriotomy technique -

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CERVICOTHORACIC JUNCTION (CTJ)

Definition of CTJ
C7~T4 (variable)

Pathologies
Degenerative, tumor, infection, trauma, deformity

Anterior surgical exposure; challenging because of
Kyphotic alignment of the upper thoracic spine → deep location of vertebral bodies

Anatomical obstacles
- Vascular: brachiocephalic trunks, aortic arch, lymphatics
- Neural: recurrent laryngeal N., phrenic N., brachial plexus
- Osseous: sternum, clavicles, 1st ribs

ANTERIOR APPROACHES TO THE CTJ
Low anterior cervical (LAC)
Trans-sternal
Trans-clavicular-trans-manubrial
Trans-manubrial
- Manubrium resection technique
- Manubriotomy technique
Low anterior cervical approach

= supra-sternal, supra-manubrial approach

Same as a conventional Smith-Robinson approach

Anterior approach up to T1~2

Accessibility depends on the patient’s thoracic inlet anatomy

- Musculature, neck length, soft tissue etc.

Trans-sternal approach

By Cauchoirx & Binet (1957), for T1-3 chondrosarcoma

High incidence of morbidity (~25%)

- Pain, pneumothorax, infection, sternal nonunion etc.

Operative mortality 40% - Hodgson et al. (1960)

Approach below T4 is impossible because of the limited retraction of aortic arch

Trans-clavicular-trans-manubrial approach

By Sundaresan et al. (1984)

Removal of rectangular block of the sternum & medial 1/3 of the clavicles

Mainly for extensive resection of CTJ tumors

Cx.- clavicle nonunion, shoulder dysfunction etc.
**Tranmanubrial approach**

Manubrium resection technique
- By Darling et al. (1995), Luk et al. (2002) etc.
- Transverse resection of the manubrim (unilaterally or bilaterally)

**Manubriotomy technique**
- Pointillart et al. (2007)
- Accessibility: down to T5
- Partial resection (upper part) of the manubrium
- Preserving the sternoclavicular (SC) joint
- Doable by spine surgeons

**Surgical Techniques of Manubriotomy**

**Skin incision**
Anterior border of the SCM ~ extend several cm down along the midline of the sternum

**Release the muscles**
Sternal head of SCM
Manubrial part of pectoralis major
2~3 cm from the sternal insertion of infrahyoid muscles

**Dissection of the retromanubrial space**
Blunt finger dissection of the retrosternal fat

**Manubriotomy**
Rectangular shape resection by osteotome & high-speed burr

Between the margin of both SC joints ~ down to manubrium-ster nal body junction

Resect the interclavicular ligaments

**Exposure of the spine**

Split the thymus (variable sized)

Ligate the inferior thymic veins and/or inferior thyroid veins

Retract the Lt. innominate vein downward

Retract the esophagus & trachea to the Rt. side (of the patient) & Lt. common carotid artery to the Lt. side (of the patient)

**DECISION OF SURGICAL APPROACH TO THE C-T JUNCTION**

The lowest accessible disc space (by Karikari et al. 2009)

By CT sagittal image

Determined by a straight line passing through and parallel to the disc space that also passes above the manubrium
Cervicothoracic angle (CTA) (by Teng et al. 2009)

By midsagittal MR image

3 points by the horizontal line on the suprasternal notch & anterior point of C7-T1 disc

<table>
<thead>
<tr>
<th>Classification</th>
<th>Caudal Part of Lesion</th>
<th>Possible Approaches</th>
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<tbody>
<tr>
<td>Type A</td>
<td>above CTA</td>
<td>ALSS</td>
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<tr>
<td>Type B</td>
<td>w/in CTA</td>
<td>ALSS or ALSS + manubr.</td>
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<tr>
<td>Type C</td>
<td>below CTA</td>
<td>ALSS + manubr. ALSS + sternotomy,</td>
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<td></td>
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<td>LPST, lat extracavitary, or trans-</td>
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<td>pedicular</td>
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* LPST = lateral parascapular thoracotomy; manubr = manubrotomy.

Routine utilization of a standard Smith-Robinson approach (by Cho et al. 2012)

By a plain lateral radiograph

If the lowest instrumented vertebra can be seen and a line passing from the intended skin incision site to this level lies on top of the manubrium

→ a routine Smith-Robinson approach can be used
REFERENCES


