



## Aero-digestive symptoms in cervical spine disorders- A neglected entity

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### General Note

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### ABSTRACT

*Background:* Dysphagia in elderly could be attributable to a number of etiological causes like stroke, malignancies, motility disorders, cervical osteophytic compression, changes in cervical spine curvature and diffuse idiopathic skeletal hyperostosis (DISH). Cervicogenic dysphagia, dysphonia and stridor in elderly are often an under diagnosed entity in otorhinolaryngology practice. The

current study was undertaken to correlate the occurrence of upper aerodigestive tract symptoms with various cervical spine disorders. *Material and Methods:* A retrospective study of 7 patients presenting with upper aerodigestive tract symptoms from January 2016 –December 2017. A detailed otorhinolaryngological examination, radiologic investigations in the form of xray neck, fluoroscopy, CT scan, endoscopic assessment of upper aero-digestive tract were done to rule out intraluminal and extraluminal causes of dysphagia, airway and voice symptoms. *Results:* Dysphagia and odynophagia are the most common otolaryngological manifestation of cervical spine disorders due to anterior osteophytes compressing the pharynx or esophagus or due to change in the curvature of the cervical spine. Dysphonia and dyspnea result from vocal cord immobilization and arytenoid oedema. The diagnosis is verified by endoscopy combined with appropriate radiological study. Correction of cervical lordotic curvature by manual therapy, resulted in improvement of dysphagia associated with loss of cervical lordotic curvature. Conservative treatment was offered for other symptoms. *Conclusion:* This is probably first otolaryngological study to have correlated endoscopic findings in patients of dysphagia, dysphonia and dyspnea with cervical spine abnormalities. Dysphagia can occur due to anterior cervical osteophytes or change in cervical spine curvature. Cervicogenic aerodigestive symptoms are only diagnosis of exclusion.

**Keywords:** Cervical spine; Lordosis; Dysphagia; Manual therapy; Elderly; Diffuse idiopathic skeletal hyperostosis (DISH); Forestier's disease; Vocal cord immobilization; Stridor.

## 1. INTRODUCTION

Cervical spine disorders like cervical spondylosis and diffuse idiopathic skeletal hyperostosis (DISH) affect primarily elderly population and are often an undiagnosed cause of otorhinolaryngological manifestations (Jain et al., 2016; Wang et al., 2011; Umerah et al., 1981; Kruk-Zagajewska et al., 1997; Akbal et al 2009; Maiuri et al., 2002). Neurologic causes like stroke, malignancies and motility disorders are other more common causes of swallowing and voice problems. DISH is usually asymptomatic and, therefore latent (Jain et al., 2016; Wang et al., 2011). After excluding these major causes, most cases of dysphagia in elderly are labelled as age related.

Dysphagia and odynophagia are the most common otorhinolaryngological manifestation of cervical spine disorders due to anterior osteophytes compressing the pharynx or esophagus or due to change in the curvature of the cervical spine (Jungade, Jain et al 2018; Mann et al., 1984). Scoliosis, kyphosis, lordosis, and other postural disorders of cervical spine can result in dysphagia (Papadopoulou et al., 2013; Howard, 2011; Grgić, 2013). Other symptoms of cervical spine disorders are dysphonia and dyspnea (Jain et al., 2016; Akbal et al 2009; Maiuri et al., 2002). Dysphagia, dysphonia and dyspnoea in the elderly are usually attributed to commoner known causes like malignancy, diabetes mellitus and neurologic conditions. The role of cervical spine disorders in causation of these otolaryngological symptoms is often neglected among otolaryngologists and many patients with no identifiable cause of vocal cord immobility are considered as idiopathic.

After exhaustive literature search, we could find only few review articles, case reports or case series, which have studied dysphagia or airway problems, in isolated conditions like DISH, or degenerative spine disorders (Jain et al., 2016; Wang et al., 2011; Umerah et al., 1981; Kruk-Zagajewska et al., 1997; Akbal et al 2009; Maiuri et al., 2002). The present study is probably first such otolaryngology study which has correlated the occurrence of various aerodigestive symptoms like dysphagia, dysphonia and dyspnoea in patients with different types of cervical spine disorders with their endoscopic findings.

## 2. MATERIAL AND METHODS

A retrospective study of 7 patients presenting in otorhinolaryngology OPD or emergency of a rural tertiary hospital of central India, with upper aerodigestive tract symptoms due to cervical spine problems, from January 2016 –December 2017. A detailed otorhinolaryngological examination, radiologic investigations in the form of xray neck, fluoroscopy, Computed Tomography (CT) scan, MRI, endoscopic assessment of upper aero-digestive tract were done to rule out intraluminal and extra-luminal causes of dysphagia, airway and voice symptoms. For assessment of the spine curvature, the images of Lateral radiograph of cervical spine were transferred to Scopydoc 8.0.0.22 version software and C2-7 angle measured by Posterior Tangent technique, by drawing angle of intersection of the posterior tangents at C2 and C7 and Cobb angle, the angle formed by the intersection of the perpendiculars (Jungade, Jain et al 2018; Nagata et al., 2011; Lipa et al., 2017).

Treatment was based on conservative strategy comprising of antibiotics, oral or injectable steroids and steroid/ adrenaline nebulization, in most cases. Manual therapy comprising of myofascial release was done in patients with change in cervical spine curvature for treatment of neck muscle spasm. Post treatment endoscopic assessment was done, in all the cases, and radiologic assessment, in cases with change in cervical spine curvature.

### 3. RESULTS

Dysphagia and odynophagia were the most common otorhinolaryngological manifestation of cervical spine disorders due to anterior osteophytes compressing the pharynx or esophagus or due to change in the curvature of the cervical spine (Table 1).

**Table 1** Dysphagia and odynophagia

|  | Dysphagia\<br>odynophagia | Change in<br>voice<br>(Dysphonia) | Respiratory<br>distress<br>(Dyspnoea) | ENDOSCOPY   | RADIOGRAPHY  |
|--|---------------------------|-----------------------------------|---------------------------------------|---|--|
| CASE 1<br>(Jain S et al.,<br>2016)             | +                         | +                                 | +                                     | Left vocal cord fixed in median position with restricted right vocal cord movements<br>Mucosal oedema of both arytenoids.   | <i>CT neck</i> --f/s/o DISH, anterior osteophytes at the level of C4-C5.<br>Anterior longitudinal ligament calcification at D2, D3, D4 and D5.<br>B/l arytenoid sclerosis        |
| CASE 2   | +                         | +                                 | -                                     | Left vocal cord mobility reduced,<br>Crico-arytenoid joint inflammation.  | <i>X-ray cervical spine</i> - Anterior and posterior osteophytes at C5-C6 level with reduced disc segment and straightening of cervical spine                                    |
| CASE 3   | +                         | +                                 | -                                     | Left pyriform fossa space reduced.<br>Left Arytenoid edema was present, Bilateral (B/l) vocal cords mobile.   | <i>x-ray cervical spine</i> - anterior osteophytes were seen at C4-C5 level with change in spine curvature.  |
| CASE 4<br>(Jungade S,<br>Jain S et al<br>2018) | +                         | +                                 | -                                     | Pooling of saliva present B/l; congestion of arytenoids present; B/l vocal cords mobile.<br><i>Upper GI flexible endoscopy</i> - scope could not be negotiated due to post cricoid narrowing.<br>Rigid esophagoscopy was normal. Scope could be introduced with difficulty. | <i>Barium swallow</i> –normal<br><i>xray cervical spine</i> –Mild straightening of cervical spine;<br>anterior osteophytes are seen.   |
| CASE 5   | +                         | -                                 | -                                     | <i>UGI endoscopy</i> - scope could not be negotiated beyond upper esophageal sphincter.   | <i>Xray Cervical Spine</i> - anterior osteophytes at C4-C5 vertebrae and change in spine curvature and disc space<br><i>Barium swallow</i> -anterior osteophytes at C4-C5 level. |
| CASE 6   | -                         | +                                 | -                                     | Left vocal cord fixed in para –median position<br>Congestion and edema of arytenoids  | <i>CT Neck</i> - anterior osteophytes at C3-C4 level.  |

|        |   |   |   |   |  |
|--------|---|---|---|---|--|
| CASE 7 | + | + | - | Congestion over arytenoids, pooling of saliva present, bilateral vocal cords mobile | X Ray Cervical Spine- reversal of cervical lordotic curvature, CT Neck – Anterior osteophytes at C4- C5 level of cervical vertebrae. |
|--------|---|---|---|---|--|

Other symptoms were dysphonia and dyspnea due to anterior osteophytes related to degenerative changes of the cervical spine or DISH. The radiography of cervical spine, showed anterior osteophytes and/or loss of cervical lordosis. In DISH, anterior longitudinal ligament calcification could be seen (Table1) (Jain et al., 2016). The osteophytes at C3-C4 level caused only dysphonia and /or dyspnea with stridor. The anterior osteophytes at C4- C6 levels were associated with dysphagia and/or dysphonia and dyspnea (Table 1, Fig. 1 & 2). In patients with change in cervical spine curvature, it was difficult to negotiate the flexible fibre-optic endoscope, mimicking a malignancy of post-cricoid region and rigid endoscopy was also difficult. Laryngeal endoscopy findings comprised of oedema and congestion of arytenoids, immobility of vocal cords, pooling of secretions and reduced space of pyriform fossa. The cervical spine curvature was assessed by “Posterior tangent measurement technique”, by which, C2 – C7 angle was found to be 52.47 ° and “The Cobb angle, was 56.42° (Jungade, Jain et al., 2018). Most patients responded to treatment based on conservative strategy comprising of antibiotics, oral or injectable steroids and steroid/ adrenaline nebulization, in the form of improvement in dysphagia, odynophagia, dysphonia and breathing difficulty. Vocal cord immobility did not respond to conservative treatment. Manual therapy comprising of myofascial release was done in patients with change in cervical spine curvature with resultant improvement in dysphagia. Post manual therapy lateral neck radiograph in one of the patients revealed restoration of cervical lordotic curvature in terms of improvement in C2 –C7 angle by “Posterior tangent measurement technique” to 56.68 ° and in “The Cobb angle, to 45.54 ° (Jungade, Jain et al., 2018).



**Figure 1** Case 2. X-ray cervical spine-Anterior and posterior osteophytes at C5-C6 level with reduced disc segment and straightening of cervical spine.



**Figure 2** Case 3. X ray cervical spine- anterior osteophytes at C4-C5 vertebrae with change in spine curvature.



**Figure 3** Case 5. X ray cervical spine- anterior osteophytes at C4-C5 vertebrae, and change in spine curvature and disc space.

## 4. DISCUSSION

In our study, dysphagia and dysphonia, both were found to be present, in patients with spine disorders like DISH and degenerative spine disease with anterior osteophytes. Anterior osteophytic compression at C3-C4 level was associated with only dysphonia. Other authors have also observed anterior osteophytes at C4-C6 as more frequent cause of oropharyngeal dysphagia than C3-C4 (Ohki, 2012; Pulcherio et al., 2014). Changes in cervical spine curvature due to muscle spasms can cause isolated swallowing problems and can mimic post cricoid malignancy or stricture. We have reported first case of dysphagia due to loss of cervical lordosis with measurement of angles of significance, namely C2-C7 angle, by Cobb technique and Posterior Tangent technique (Jungade, Jain et al 2018). This case was benefitted by manual therapy by myofascial release of neck muscles. Mekata et al., 2013, observed that cervical spine moves to reduce physiological lordosis during deglutition and that the decrease of cervical motion in elderly population may have negative influence on swallowing (Mekata et al., 2013). The influence of neck postural changes, especially the "retraction posture" on cervical spine motion and angle during swallowing, has been reported by others (Kim et al., 2017).

Dysphonia is caused by postcricoid ulceration at pressure point between the posterior aspect of cricoid cartilage and a protruding osteophyte, which leads to chondritis of the cricoid cartilage and arytenoid, with subsequent ankylosis of crico-arytenoid joint (Jain et al., 2016; Anand et al., 2011). Hence, laryngeal endoscopy findings comprising of oedema and congestion of arytenoids, immobility of vocal cords, pooling of secretions and reduced space of pyriform fossa, depend on the site and degree of osteophytic compression and the duration of symptoms. Long standing irritation leads to fixation of the crico-arytenoid joint with immobility of the vocal cords.

Dysphagia and odynophagia in DISH, (ankylosing spondylitis), is usually progressive and more severe for solids than for liquids. Diagnosis in cervicogenic dysphagia and dysphonia is verified by appropriate radiological study. Conservative treatment is beneficial in most cases. Refractory dysphagia and respiratory impairment due to anterior osteophytes may require surgical management (Ido et al., 2002).

## 5. CONCLUSION

Cervical spine disorders like degenerative spine diseases and change in cervical spine curvature are common in the elderly and cervicogenic dysphagia and dysphonia should be considered in the differential diagnosis. The osteophytes at C3-C4 level cause mainly dysphonia and /or dyspnea with stridor. The anterior osteophytes at C4- C6 levels may be associated with dysphagia and/or dysphonia and dyspnea. In patients with change in cervical spine curvature, it may be difficult to negotiate the flexible fibre-optic endoscope and also rigid oesophagoscope, mimicking a malignancy of post-cricoid region. Laryngeal endoscopy findings, in such cases, may comprise of oedema and congestion of arytenoids, immobility of vocal cords, pooling of secretions and reduced space of pyriform fossa. Radiological imaging of cervical spine and Orthopaedic and/ or physiotherapist opinion should be included in the investigative workup of aero-digestive symptoms in the elderly. These are diagnosis of exclusion and when identified, a multidisciplinary approach should be instituted as soon as possible. Manual therapy by myofascial release may help in relieving neck spasm and improve spine curvature, with a potential to improve swallowing disorder.

### Authorship

| Name of authors:<br>(corresponding author first ) | Authorship:   |
|---|---|
| Shraddha Jain                                     | Conception and design of the work;<br>the acquisition, analysis, and interpretation of data for the work.<br>Drafted the work and revised it critically for important intellectual content.<br>Approval of final version of manuscript to be published. |
| Shyam Jungade                                     | the acquisition, analysis, and interpretation of data for the work.<br>Approval of final version of manuscript to be published.   |
| Deepshikha Chandravanshi                          | The acquisition of data for the work.<br>Approval of final version of manuscript to be published.   |

### Conflict of Interest Statement

Authors Shraddha Jain, Shyam Jungade and Deepshikha Chandravanshi declare that they have no conflict of interest. "All authors agree that they are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved." All authors certify that their manuscript is their original work. All data in the paper are real and authentic.

### Informed consent

Research involves Human Participants. The study has been approved by the "institutional research ethics committee" and has been performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. No animals involved in the study. Informed consent was obtained from all individual participants included in the study.

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