

Atlantoaxial subluxation

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Introduction

The atlantoaxial joint is a three synovial joints complex between the C1 and C2 vertebrae. It is the most mobile vertebral articulation. This joint is stabilised by several ligaments and membrane, namely the cruciate ligament which comprises the transverse ligament and the superior and inferior crura as well as the tectorial membrane which is the rostral continuation of the posterior longitudinal ligament.¹ Atlantoaxial subluxation, if not detected early, can result in detrimental consequence e.g. paraplegia from injury to the spinal cord. It has a myriad of causes apart from trauma which is the most common aetiology. We will explore a few causative factors that can be further divided into congenital and acquired causes.

Causes

1. Post radiotherapy for tumour

Radiation induced osteonecrosis and ligament laxity of primary or secondary neoplasm in the head and neck region should be suspected especially if the radiation field includes the craniocervical region and high radiation dose was employed to treat the tumour.

65/M with history of nasopharyngeal carcinoma (NPC) post radiotherapy presented with postoperative neck pain, stiffness and inability to turn his head. He was not febrile and the infective markers were not raised. The CT shows left sided nasopharynx is patulous from treated NPC. The lateral spine radiograph shows widening of the atlantodental interval. The sagittal post contrast T1w MRI which shows soft tissue and narrow enhancement of the atlantoaxial joint.

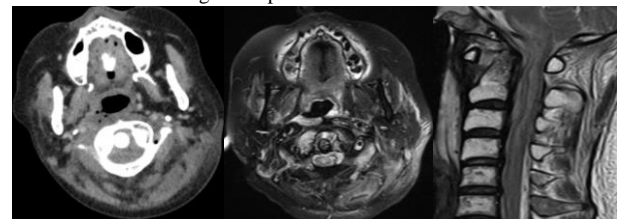


2. Infection

We would like to highlight Grisel syndrome which was described by Grisel as a syndrome in 1951 following two cases of non-traumatic atlantoaxial rotatory subluxation following recent history of pharyngitis. This rare syndrome predominantly occurs in paediatric patients (~68% of cases involve children younger than 12 years and ~90% involve subjects younger than 21 years).² The most accepted theory proposed was transverse and alar ligaments laxity by hyperemia. Parke et al demonstrated that veins of the posteriorsuperior pharynx communicate with the periodontoid venous plexus and the epidural suboccipital venous sinuses through the pharyngovertebral veins, providing a haematogenic transport route for septic exudates to structures of the upper cervical spine.^{2,3}

42/F with history of NPC and bone metastases treated with chemo- and radiotherapy. She presented with fever, left sided neck swelling, stiffness, anorexia, lethargy and pain.

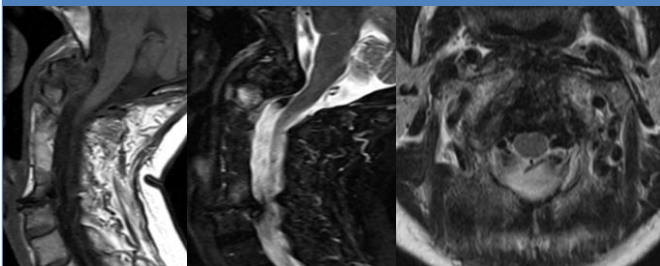
Contrast enhanced CT shows hypodense collection with gas bubbles in the right prevertebral space and nasopharynx suggesting abscess. There is also fat stranding in the paraspinal muscles and left nape subcutaneous tissue which enhance on the axial post-contrast T1w sequence. Note that the right C1 lateral mass is also enhancing suggesting osteomyelitis. The atlantodental interval is widened on the sagittal T2w image which also shows oedema in the cervical cord extending to the pons.



3. Arthropathy

Rheumatoid and calcium pyrophosphate dihydrate (CPPD) can cause atlantoaxial subluxation due to pannus formation and CPPD crystal deposition. CPPD tend to cause ligamentous calcification and retrodental soft tissue thickening. There may also be erosions of the dens which contribute to the subluxation.⁴

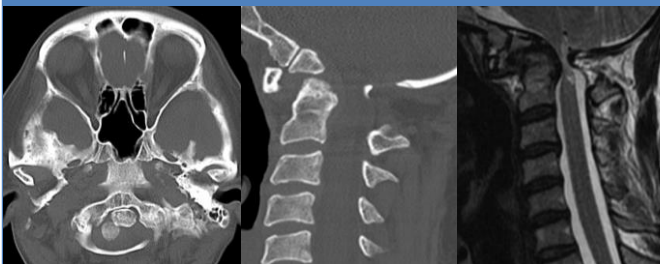
74/F without history of rheumatism presented with neck pain. Sagittal T1w image shows soft tissue thickening at the atlantoaxial joint, most marked at the retrodental region. There is narrowing of the foramen magnum seen on the sagittal STIR sequence. There is abutment of the cervicomedullary junction on the axial T2w sequence. This is likely CPPD arthropathy with crowned dens.



4. Traumatic or os odontoideum

A well corticated bone superior to the odontoid peg can be either due to old trauma or os odontoideum. Clinical history should be able to ascertain the diagnosis. Os odontoideum is also an association in Down syndrome and should be looked for in affected patients presenting with neck pain apart from basilar invagination.⁵

38/F presented with whole body numbness. The CT shows a well corticated bone fragment anterosuperior to the dens. There are basilar invagination and atlantoaxial subluxation. There is gliosis and myelomalacia of the cervicomedullary junction denoting chronicity. This is either due to prior trauma or os odontoideum which was to be correlated with prior history of trauma or congenital anomaly.



Reference

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