

Lateral Atlantoaxial Osteoarthritis Accompanied with Large Subchondral Cysts: A Case Report of Incidental Finding on CBCT

Büyük Subkondral Kistler ile Eşlik Eden Lateral Atlantoaksiyel Osteoartrit: KIBT’de Tesadüfi Rastlanan Olgu

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ABSTRACT Atlantoaxial osteoarthritis (AAOA) is a unique clinical syndrome that differs from other degenerative disorders. It is a heterogeneous disease associated with the loss of the integrity of the articular cartilage with changes in the underlying bone and cortical edges. One of the biggest clinical challenges with AAOA is making a diagnosis. In dentistry, given the increasing use of cone beam computed tomography (CBCT) to evaluate maxillofacial structures, it is likely that dentists will encounter these lesions on CBCT scans. It is extremely important for dentist to systematically examine anatomical structures other than teeth during clinical and radiographic evaluation in terms of early diagnosis and to prevent delays in treatment. This article presents the case of AAOA accompanied by a subchondral cysts as a random finding on CBCT.

Keywords: Cone beam computed tomography; oral and maxillofacial radiology; osteoarthritis; subchondral cyst

ÖZET Atlantoaksiyel osteoartrit (AAOA), diğer dejeneratif bozukluklardan farklı özgün bir klinik sendromdur. Altta yatan kemik ve kortikal kenarlarındaki değişikliklerle eklem kıkırdığının bütünlüğünün kaybı ile ilişkili heterojen bir hastalıktır. AAOA ile ilgili en büyük zorluklardan biri, tanı koymaktır. Diş hekimliğinde, maksillofasiyal yapıları değerlendirmek için konik ışınli bilgisayarlı tomografinin (KIBT) kullanımının yaygınlaşması ile diş hekimlerinin KIBT taramalarında bu lezyonlarla karşılaşmaları muhtemeldir. Diş hekimlerin klinik ve radyografik değerlendirme sırasında diş dışındaki anatomik yapıları da sistematik olarak incelemeleri erken teşhis ve tedavide geçikmelerin önlemesi açısından son derece önemlidir. Bu makale, KIBT’de rastlantısal bir bulgu olarak subkondral kistlerin eşlik ettiği AAOA olgusunu sunmaktadır.

Anahtar Kelimeler: Konik ışınli bilgisayarlı tomografi; oral ve maksillofasiyal radyoloji; osteoartrit; subkondral kist

Cone-beam computed tomography (CBCT) is used for imaging of the dentomaxillofacial field for wide range of diagnostic assignments. Usually, an area of the cervical vertebra can be seen on CBCT, particularly during large field of view scans. Among the incidental findings affecting the cervical vertebrae are degenerative changes, fusion and non-segmentation of spinal bodies, and existence of surgical equipment.¹

Multiple clinical disorders in the superior vertebra can be manifested as suboccipital pain. Atlantoaxial osteoarthritis (AAOA) may be potential reason of this pain. This disorder usually occurs in elderly patients and is worth considering clinically and

radiologically in elderly patients (>50 years of age) with unknown suboccipital pain.² Patients often complain of a single unilateral neck pain that occurs at the slightest turn of the head. The pain may rise to the occipital, parietal ve orbital region.³

Although atlantoaxial joints allows various actions and it is incessantly used for orientation and head motions, degeneration in the atlantoaxial area is not so usual.⁴ The prevalence ranges from 5.4 to 18.2%.² Most of the patients are women (74%) with unilateral arthritis (76%).⁵ Despite the fact that lateral joints are synergistic, bilateral engagement of those joints happen to be very rare.²

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Peer review under responsibility of Türkiye Klinikleri Journal of Dental Sciences.

Received: 25 May 2022

Received in revised form: 18 Nov 2022

Accepted: 23 Nov 2022

Available online: 01 Dec 2022

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Narrowing of the joint space presents a radiographic evidence for osteoarthritic changes involving damage of articular cartilage and creating a gap between the articular surface areas.⁶ Subchondral cysts which occurs in the dens axis can be a possible reason for cervical damage after relatively minor trauma, since intraosseous cysts are considered to significantly affect the mechanical integrity of the bone.⁷

The development of cysts may lead to a successive disintegration of the subchondral bone and its evolution to deformation. Therefore, subchondral cysts are profoundly associated with evolution of osteoarthritis (OA). Accordingly concept of subchondral cyst development is substantial for understanding the pathogenesis of OA.⁸

In this article, we emphasize the importance of systematically examination of anatomical structures other than teeth during clinical and radiographic evaluation in terms of early diagnosis and to prevent delays in treatment. We present the case of atlantoaxial degenerative changes accompanied by subchondral cysts in a 76-year-old female patient, which were detected incidentally.

A CASE REPORT

A seventy six years old female patient with a planned cardio-vascular operation was referred to our clinic from the department of cardiology, for detecting possible intraoral focal infection. Review of her medical history revealed tricuspid valve insufficiency and diabetes. Also, the patient noted that she felt severe head and neck pain for a long time. On extraoral examination, asymmetry, swelling, lymphadenopathy were not detected. Also there were no pathologies in the appearance of the skin. On examination of temporomandibular joints and muscles, symptoms such as difficulty opening the mouth, pain, muscle spasms or decreased mouth opening were not observed. On the other hand, a restriction in the rotation of the head to the left was found and the patient said that she felt pain. On intraoral examination, it was observed that the patient was toothless. The oral mucosa was normal in appearance. Informed consent was taken from patient.

In routine panoramic radiography, irregular mixt pattern was observed in the region of the left C1-C2 vertebrae (Figure 1).

In the CBCT images taken for detailed review, 2 large radiolucent lesions compatible with the subchondral cyst were observed in the C2 vertebral body (Figure 2, Figure 3). Cortical resorption, osteophyte formation, subchondral sclerosis, residual bone and multiple subchondral cysts were observed in the left lateral atlantoaxial joint region. In addition, a significant reducing of the joint cavity of the left lateral joint was perceived (Figure 4, Figure 5). Compared to the right side, there is a decrease of about 2.1 mm in the joint cavity of the left lateral joint.

Based on the clinical and radiological findings, a preliminary diagnosis of lateral AAOA was made.

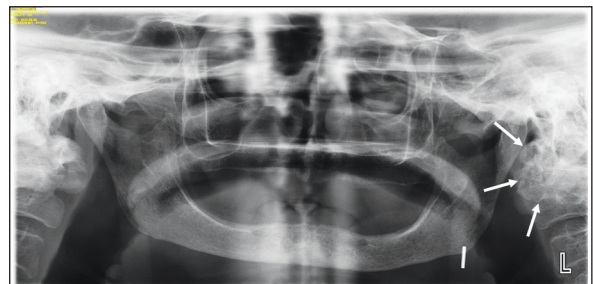


FIGURE 1: Predominantly radiopaque mixed pattern with lithic areas of the left C1-C2 vertebral region and evident assymetry between left and right side on panoramic radiography.

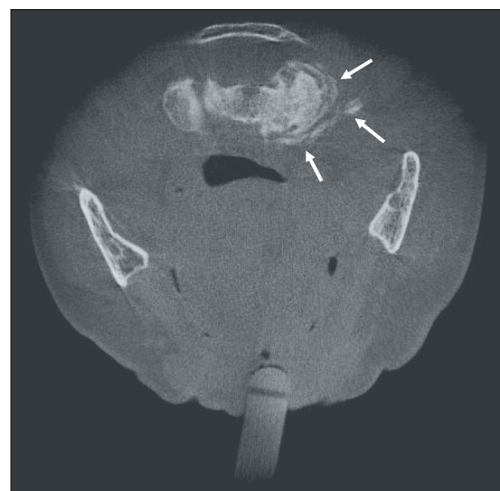


FIGURE 2: Axial cross-sectional CBCT image: Cortical resorption, reduction of bone trabeculation, osteophyte formation and multiple remains of residual bone.

CBCT: Cone-beam computed tomography.

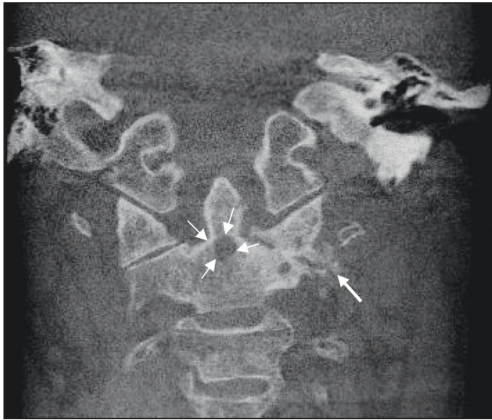


FIGURE 3: Coronal cross-sectional CBCT image: Subchondral cysts, sclerosis and osteophyte formation with reduced joint space and residual bone. CBCT: Cone-beam computed tomography.



FIGURE 4: Sagittal cross-sectional CBCT image: Reduced joint space, cortical resorption and subchondral cysts. CBCT: Cone-beam computed tomography.

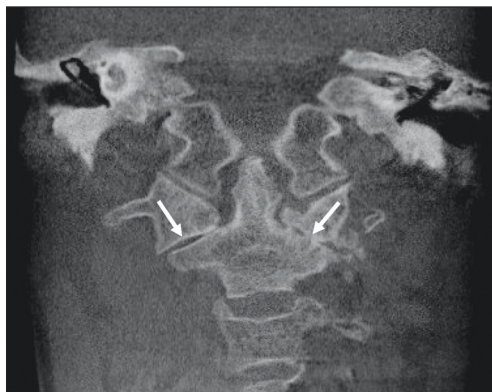


FIGURE 5: Coronal cross-sectional CBCT image: The difference between the right (2.39 mm) and left (0.26) lateral joint space. CBCT: Cone-beam computed tomography.

Rheumatoid arthritis was included in the differential diagnosis, so the patient was referred to the rheumatology clinic. After eliminating the rheumatoid arthritis the patient was referred to the physical therapy and rehabilitation department and our preliminary diagnosis was confirmed. Conservative treatment of the patient is underway.

DISCUSSION

CBCT provides useful information for evaluation of osteoarthritic changes in atlanto-axial joint. Oral and maxillofacial radiologists should report radiologic changes of this region even if patients have no complaint and take into consideration osteoarthritic changes of atlanto-axial joint in patients who have referred cervical pain for differential diagnosis of temporomandibular joint and related muscle disorders.⁹

When considering this case, our main purpose is to underline the importance of comprehensive examination of all anatomic structures which can be seen on dental radiography. Patients with AAOA may present with symptoms which are attributed to myofascial pain, a soft tissue etiology or temporomandibular joint disorders. Our case, therefore, also highlights the need of differential diagnosis.

Lateral AAOA is predominant in population where head-loading functions are frequent.¹⁰ Although existence of symptoms and radiological signs may not be statistically related with each other, the clinical and radiological image may have role in determining of these issues.¹¹

There is supposed to be around 600 actions which happen per hour in the cervical vertebra field and this field is exposed to significant stress.¹⁰ The incapability to evenly share stress in all ways leads to characteristic changes of the bones and the related cartilage, especially, the formation of subchondral cysts, sclerosis, narrowing of the joint cavity vacuum phenomena and calcification of ligaments.¹²

Recognizing the demographical and radiological features of this osteoarthritis is important for reducing the effect of osteoarthritis and taking treatment measures. Conservative treatment should be carried out when the treatment is effective and as long as the symptoms are tolerable. However, if the

pain is persistent, surgery is indicated in the form of atlantoaxial arthritis.³ It is important that the follow-up and radiographic examinations of patients are performed in regular intervals.

As a result, this phenomenon reveals the importance of a comprehensive clinical and radiological assessment of all patients, and alternative, highlights the need for the consideration of advanced imaging techniques. It is important for dentists to improve their understanding of the anatomy and potential pathologies of the structures of the head and neck. Oral and maxillofacial radiologists should consider osteoarthritic changes of the atlantoaxial joint, especially in differential diagnosis of the temporomandibular joint and related muscles for patients who have resorted with cervical pain.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct con-

nection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Bilay Stevanovic Sancar, Rümeyşa Şendişçi, Sevcihan Günen Yılmaz; **Design:** Bilay Stevanovic Sancar, Rümeyşa Şendişçi; **Control/Supervision:** Sevcihan Günen Yılmaz; **Data Collection and/or Processing:** Bilay Stevanovic Sancar, Rümeyşa Şendişçi; **Analysis and/or Interpretation:** Sevcihan Günen Yılmaz; **Literature Review:** Bilay Stevanovic Sancar, Rümeyşa Şendişçi; **Writing the Article:** Bilay Stevanovic Sancar, Rümeyşa Şendişçi; **Critical Review:** Sevcihan Günen Yılmaz; **References and Findings:** Bilay Stevanovic Sancar, Rümeyşa Şendişçi; **Materials:** Bilay Stevanovic Sancar, Rümeyşa Şendişçi.

REFERENCES

- Allareddy V, Vincent SD, Hellstein JW, Qian F, Smoker WR, Ruprecht A. Incidental findings on cone beam computed tomography images. *Int J Dent.* 2012;2012:871532. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
- Zapletal J, de Valois JC. Radiologic prevalence of advanced lateral C1-C2 osteoarthritis. *Spine (Phila Pa 1976).* 1997;22(21):2511-3. [[Crossref](#)] [[PubMed](#)]
- Schaeren S, Jeanneret B. Atlantoaxial osteoarthritis: case series and review of the literature. *Eur Spine J.* 2005;14(5):501-6. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
- Grob D, Bremerich FH, Dvorak J, Mannion AF. Transarticular screw fixation for osteoarthritis of the atlanto axial segment. *Eur Spine J.* 2006;15(3):283-91. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
- Halla JT, Hardin JG Jr. Atlantoaxial (C1-C2) facet joint osteoarthritis: a distinctive clinical syndrome. *Arthritis Rheum.* 1987;30(5):577-82. [[Crossref](#)] [[PubMed](#)]
- Betsch MW, Blizzard SR, Shinseki MS, Yoo JU. Prevalence of degenerative changes of the atlanto-axial joints. *Spine J.* 2015;15(2):275-80. [[Crossref](#)] [[PubMed](#)]
- Jost SC, Hsien Tu P, Wright NM. Symptomatic intraosseous synovial cyst in the cervical spine: a case report. *Spine (Phila Pa 1976).* 2003;28(17):E344-6. [[Crossref](#)] [[PubMed](#)]
- Chiba K, Burghardt AJ, Osaki M, Majumdar S. Three-dimensional analysis of subchondral cysts in hip osteoarthritis: an ex vivo HR-pQCT study. *Bone.* 2014;66:140-5. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
- Yeşilova E, Bilgir E. The evaluation of atlanto-axial joint with cone beam computed tomography (CBCT). *Selcuk Dental Journal.* 2019;6(4):274-9. [[Link](#)]
- Badve SA, Bhojraj S, Nene A, Raut A, Ramakanthan R. Occipito-atlanto-axial osteoarthritis: a cross sectional clinico-radiological prevalence study in high risk and general population. *Spine (Phila Pa 1976).* 2010;35(4):434-8. [[Crossref](#)] [[PubMed](#)]
- Dreyfuss P, Rogers J, Dreyer S, Fletcher D. Atlanto-occipital joint pain. A report of three cases and description of an intraarticular joint block technique. *Reg Anesth.* 1994;19(5):344-51. [[Crossref](#)] [[PubMed](#)]
- Genez BM, Willis JJ, Lowrey CE, Lauerman WC, Woodruff W, Diaz MJ, et al. CT findings of degenerative arthritis of the atlantodentoid joint. *AJR Am J Roentgenol.* 1990;154(2):315-8. [[Crossref](#)] [[PubMed](#)]