

Olgu Sunumu

A Rare Case of Trauma in Association of Atlantooccipital Assimilation and Accessory Articulation: Multiple Isolated Spinous Process Fractures

Atlantookspital Asimilasyon ve Aksesuar Artikülasyonun Eşlik Ettiği Nadir Bir Travma Olgusu: Multipl Spinöz Process Fraktürü

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ABSTRACT

Atlantooccipital fusion or occipitalization or assimilation of the atlas is a rare congenital anomaly demonstrated in anatomical, radiological, and morphological studies. Clay-shoveler's fracture, which is an isolated multiple fracture of the cervical and thoracic vertebrae, and this fusion association is extremely rare and we had an opportunity to understand the mechanism of Clay-shoveler's fracture.

A 58 years-old female patient was admitted to the emergency department due to a hyperflexion injury as a result of a traffic accident. Multiple spinous process fractures were detected at the C3-C5-C6-T1-T2-T3-T4 levels on computed tomography images. In addition, there was an image of atlantooccipital assimilation at the craniovertebral junction.

Multiple levels spinous process fractures are extremely rare lesions that occur as a result of direct trauma or repetitive traction. They are usually conservative without the need for surgery. However, as in our case, a more detailed neuro-radiological examination should be performed to detect accompanying incidental anomalies or more serious spinal traumas.

Keywords: Occipitalization, Assimilation, Clay-shoveler's.

ÖZET

Atlantookspital füzyon veya oksipitalizasyon veya atlasın asimilasyonu anatomik, radyolojik ve morfolojik çalışmalarda gösterilen nadir bir konjenital anomalidir. Servikal ve torasik omurların izole çoklu kırığı olan Clay-shoveler kırığı ve bu füzyon birlikteliği son derece nadir olup Clay-shoveler kırığının mekanizmasını anlama fırsatı bulduk. 58 yaşında kadın hasta trafik kazası sonucu oluşan hiperfleksiyon yaralanması nedeniyle acil servise başvurdu. Bilgisayarlı tomografi görüntülerinde C3-C5-C6-T1-T2-T3-T4 düzeylerinde çok sayıda spinöz çıkıntı kırığı tespit edildi. Ayrıca kraniyo-vertebral bileşkede atlantookspital asimilasyon görüntüsü mevcuttu. Çok seviyeli spinöz proses kırıkları, doğrudan travma veya tekrarlayan traksiyon sonucu oluşan son derece nadir lezyonlardır. Genellikle ameliyata gerek kalmadan konservatifdirler. Ancak bizim olgumuzda olduğu gibi eşlik eden rastlantısal anomalilerin ya da daha ciddi omurga travmalarının tespiti için daha detaylı bir nöroradyolojik inceleme yapılması gerekmektedir.

Anahtar kelimeler: Oksipitalizasyon, Asimilasyon, Clay-shoveler's.

Atlantooccipital fusion or occipitalization or assimilation of the atlas is a rare congenital anomaly demonstrated in anatomical, radiological, and morphological studies. It is seen between 0.12% and 0.72% (1). It develops as a result of the failure of segmentation between the fourth occipital and first cervical sclerotomas. Assimilation can be complete or incomplete. Isolated spinous process fractures of the cervical and thoracic vertebrae are defined as Clay-shoveler's fractures (2). There is an avulsion-type injury on the in-

terspinous ligaments. Although this type of injury is rare, it usually occurs after a trauma or sports injury (3, 4). Fractures at multiple levels are less common (5). These fractures are stable conditions and are usually treated conservatively. In addition, isolated spinous process fractures are considered a warning for more severe spinal injuries. Therefore, careful evaluation is required to detect more serious spinal injuries in these cases (2).

In this case, we presented a case with congenitalatlan-

tooccipital assimilation and multiple fractures of the cervical and thoracic spine spinous processes after trauma (A written informed consent was obtained from the patient for publication of this case report).

CASE REPORT

A 58 years-old female patient was admitted to the emergency department due to a hyperflexion injury as a result of a traffic accident. At the time of admission, the patient had pain with palpation on the spinous processes in the cervical and thoracic regions. Neurological examination was normal and there were no defects in motor and sensory examination in all extremities. There was also no sign of blunt trauma. Multiple spinous process fractures were detected at the C3-C5-C6-T1-T2-T3-T4 levels on computed tomography (CT) images (Figure 1).



Figure 1. Spinous process fractures are seen on sagittal CT image.

In addition, there was an image of atlantooccipital assimilation at the craniovertebral junction. The diagnosis of this congenital anomaly was made incidentally. There was also C1-occipital accessory articulation (Figure 2) (6).



Figure 2. A) In coronal CT image, arrow indicates atlantooccipital assimilation and star indicates the accessory C1-occipital articulation. B) Atlantooccipital assimilation in sagittal CT image shown by arrow.

No other additional pathology was observed in magnetic resonance imaging (MRI). The patient was hospitalized for 48 hours and discharged with a nonsteroidal anti-inflammatory drug (NSAID) and analgesic treatment. She used cervical and thoracic corsets for 8 weeks by applying conservative treatment. After 6 months of follow-up the patient, whose pain complaint decreased and improved over time, had no loss of function observed in daily living activities. The visual analog scale (VAS) score for pain improved from 8/10 to 2/10.

DISCUSSION

Clay-shoveler's fracture has been reported under different names in the literature in the early twentieth century in English trenchers, French soil workers, and German retired workers (7). Clay-shoveler's fracture is very rare and C7 and T1 vertebrae are frequently affected. The spinous processes of these vertebrae are thinner and longer than the other vertebrae at close levels. Therefore, the risk of developing fractures is higher due to repetitive stress and strong trauma (7). Excessive hyperflexion-hyperextension or sudden forceful contractions of the trapezius and rhomboid minor muscle groups in trauma cause fractures (7, 8). In our case, there was a hyperflexion mechanism of the head during the traffic accident. The pain is usually sharp, radiating from the midline bilaterally to the shoulders and arms. Patients typically tend to keep the neck slightly bent and the shoulders elevated. Neck and shoulder movements are painful. Neurological deficits may be seen due to accompanying pathologies (9). A neurological examination of our case was normal and she typically had severe pain. No concomitant traumatic pathology was observed. However, incidentally, atlantooccipital assimilation was observed. Although direct radiography is mostly sufficient in the diagnosis, it is necessary to apply CT and MRI to diagnose more serious additional spine and soft tissue injuries. In addition, direct radiographs may give an inadequate image, as patients tend to keep their shoulders up (10). MRI is particularly useful in demonstrating ligament damage. Anterior longitudinal ligament and anterior annulus fibrosus injuries can also be seen after hyperflexion-hyperextension injuries (2). In our case, there was a spinous process fracture at C3-C5-C6-T1-T2-T3-T4 levels on CT images. There was no additional bone pathology except atlantooccipital fusion. We did not detect ligament damage or any other pathology on MRI images.

The atlantooccipital joint is between the superior articular facet of the atlas and the occipital condyles. Although they are two separate joints, they move together. It is primarily responsible for movement in the sagittal plane. Flexion is limited by the dens axis corresponding to the anterior margin of the foramen magnum, and extension by tectorial membrane tension. The alar ligaments restrict the lateral and rotational movements of this junction to about 5 degrees.

Neurological disorders often occur in the 3rd and 4th decades of life in the patient with atlantooccipital assimilation. Symptoms such as ataxia, numbness, and pain may occur by compression of the spinal cord due to soft tissue and bone structure abnormalities (11). However, we did not see spinal cord compression in our case and she did not have any symptoms. In addition, rheumatology consultation was requested in our case and rheumatological disease was not considered. We mentioned that hyperflexion injuries are involved in the etiology of such cases. Since there was also atlantooccipital assimilation in our case, we thought that movement was restricted at the craniovertebral junction due to hyperflexion injury and the tension force was concentrated in the posterior spine. Therefore, we concluded that multiple-level spinous process fractures occur and especially affect upper cervical levels. When we analyzed the literature, we did not find a similar case.

In conclusion, multiple levels spinous process fractures are extremely rare lesions that occur as a result of direct trauma or repetitive traction. They are usually

conservative without the need for surgery. However, as in our case, a more detailed neuroradiological examination should be performed to detect accompanying incidental anomalies or more serious spinal traumas.

Availability of data and materials:

Data and material are available on a reasonable request from the author.

Abbreviations:

CT: Computed tomography

MRI: Magnetic resonance imaging

NSAID: Nonsteroidal anti-inflammatory drug

VAS: Visual analog scale

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Ethics declarations

Ethics approval and consent to participate: Approval has been taken from the ethics committee.

Consent for publication: The patient's consent was obtained for publication.

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