Case Report

Can External Occipital Protrusion Be the Cause of Shoulder Pain?

Abstract

The external occipital protuberance (EOP) can sometimes be felt as a palpable swelling and sometimes as a protrusion extending downward. It is also called an inion hook. EOP bony tubercle can be generally classified into three types: flat form (type 1), crest type (type 2), and protrusion type (type 3). In this report, we present a 32-year-old adult male patient with right shoulder pain. On examination, pain extending from the occipital region to the shoulder was observed. Type 3 EOP protrusion was incidentally detected on X-ray imaging. When “EOP” was searched in PubMed, anatomical and imaging studies were found. It was found to be clinically associated with headache in studies in terms of size and type. We think that this is the first case of EOP protrusion associated with shoulder pain.

Keywords: *External occipital protuberance, inion hook, occipital exostosis, occipital protrusion, occipital tubercle*

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Introduction

The external occipital protuberance (EOP) is an anatomical structure located on the posterior surface of the occipital bone at the level of the upper nuchal line. It is the insertion site of the nuchal ligament and trapezius muscle.[1] It is also called an inion hook. The trapezius muscle arises from the EOP and the medial half of the superior nuchal lines. EOP can be generally classified into three types: flat form (type 1), crest type (type 2), and protrusion type (type 3).[2] In the present study, a cranium was detected in which a bony tubercle was found projecting from the EOP. When “EOP” was searched in PubMed in the last 5 years, anatomical and imaging studies were found. It was found to be clinically associated with headache in studies in terms of size and type. We think that this is the first case of EOP protrusion associated with shoulder pain.

Case Report

We report a 32-year-old young adult male patient. He complained of pain in his right shoulder and radiating from the shoulders to the neck while lying supine and working at a desk for a long time. Sometimes he also had headaches. On physical examination, the range of motion of both shoulder joints was normal. Neurological examination was normal. Neer and Jobe tests were negative. There was tenderness on palpation over the posterior fibers of the trapezius muscle. A pea-sized swelling was palpated on EOP. There was no evidence of discharge, infection, or inflammation. There were no known comorbidities.

X-ray imaging showed no shoulder pathology. No signs of impingement were seen [Figure 1]. On cervical lateral radiography, an exophytic structure was observed in the occipital protuberance, and the distance between the two longest points was measured as 16.4 mm [Figure 2].

A brain computed tomography (CT) was ordered to examine the protrusion in detail and to rule out intracranial pathologies that could cause neurologic symptoms. Cervical CT was ordered to rule out cervical bone pathologies. No tumoral bone pathology such as osteoid osteoma, enchondroma, or traumatic degenerative changes was observed. No acute or chronic intracranial pathology was found in the brain CT, but EOP protrusion was observed. The protrusion had a longer course on the posterior fibers of the right trapezius muscle, extending from its insertion to its origin. The EOP tubercle measured 12.4 mm in length, 26 mm in width, and 11.4 mm in thickness between the two most distal points in the sagittal plane and

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How to cite this article: Aydın ME, Atik A. Can external occipital protrusion be the cause of shoulder pain? J Anat Soc India 2025;74:363-5.

Article Info

Received: 07 March 2025
Revised: 13 June 2025
Accepted: 23 November 2025
Available online: 31 December 2025

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Access this article online

Website: https://journals.lww.com/joai

DOI: 10.4103/jasi.jasi_48_25

Quick Response Code:

axial plane, respectively [Figure 3]. Our findings were compatible with a type 3 EOP bone tubercle.[2]

Cervical magnetic resonance imaging (MRI) was ordered for spinal nerve compression and additional pathologies that may cause shoulder pain. No pathology requiring surgical intervention was observed. Shoulder MRI was ordered for a rotator cuff tear and additional pathologies involving the shoulder. No significant pathology was observed except for minimal effusion around the biceps tendon [Figure 4]. In addition, no pathology was observed when evaluated in terms of rheumatologic diseases such as fibromyalgia. Shoulder pain was thought to be due to EOP protrusion.

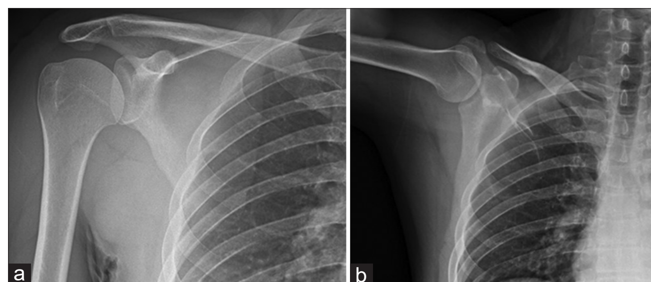

Figure 1: X-ray view of the right shoulder. (a) anterior anatomical position, (b) semiabduction position

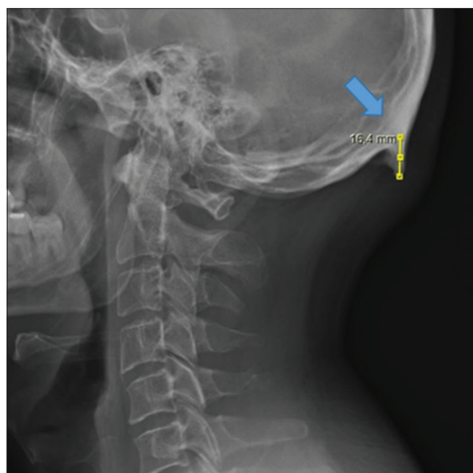

Figure 2: X-ray of the craniocervical lateral view. The tubercle structure in the occipital protrusion is shown with a blue arrow. The distance between the longest two points was measured as 16.4 mm

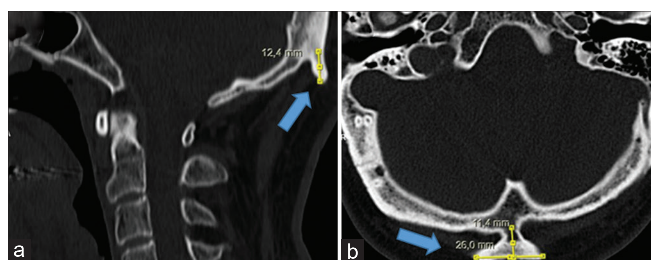

Figure 3: Computed tomography section of the cranium. The tubercle structure in the occipital protrusion is shown with a blue arrows. (a) sagittal section view of the external occipital protuberance (EOP) protrusion measured 12.4 mm in length, (b) axial section view of the EOP protrusion measured 26 mm in width and 11.4 mm in thickness between the two most distal points

The patient was given medical treatment. Oral nonsteroidal anti-inflammatory drug (NSAID, etodolac 500 mg) was administered twice daily, antispasmodic drug (tizanidine 2 mg) twice daily, and locally acting NSAID cream was applied twice daily (2 doses per day). Physiotherapy and rehabilitation were applied to the patient whose complaints regressed but did not completely resolve.

Discussion

In this study, we present the clinical outcome of a bone tubercle protruding from the EOP. This tubercle is an extra bony growth, different from a normal occiput. Therefore, vertical biomechanical movements of the neck can cause occipital headache due to this additional bony growth acting on nearby neurovascular structures. When bone protrusions rub against soft tissues such as ligaments, tendons, nerves, and blood vessels, they can cause wear and tear or pain. The most common locations for these bone protrusions are the shoulders, hands, knees, feet, and obturator foramen.[3] The literature on EOP-related tubercles is limited.

When “inion hook” was searched, one study was found. In this study, the relationship between traumatic occipital spur fracture was investigated.[4]

When “EOP” was searched in PubMed, anatomical, cadaver forensic, and imaging studies were found.[5-7] Clinical studies have focused on headaches.[5,8-11] We say that it can also be the cause of shoulder pain. If this tubercle is not identified, the headache may be misdiagnosed and lead to unnecessary diagnostic surgeries. Therefore, to prompt relevant clinicians for the management and treatment of associated diseases, the study was conducted through this case report. We believe that this is the first EOP tubercle case causing shoulder pain.

There are different opinions about EOP-related bone tubercle formation. There are different opinions that occipital protrusion is more common in young adults and is associated with postural changes (Jacques *et al*. in 2020 and Shahar and Sayers in 2016).[12,13]

Three subtypes were defined by Gülekon and Turgut: flat form (type 1), crest type (type 2), and protrusion type (type 3).[2] EOP protrusion is an anatomical problem that is mostly symptomatic and occurs during adolescence. The authors suggested that there is limited information on the evolving EOP protrusion.[14]

It can usually be treated with analgesia or other rehabilitation methods.[8] In cases that cannot be resolved despite all noninvasive methods, bony correction of the tubercle can be achieved by surgical resection.[8]

Shoulder pain may develop in young patients due to many causes. In cases with persistent shoulder pain in which

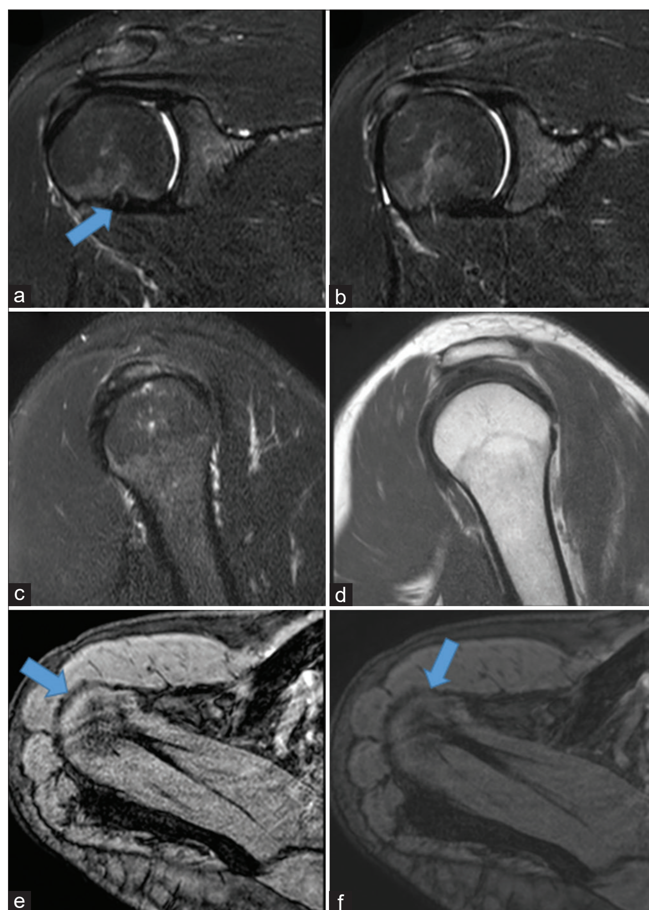

Figure 4: Sectional magnetic resonance imaging of the shoulder. (a) Coronal section view of the humeral head. (a) Biceps tendon was created with the blue arrow, (b-d) the rotator cuff is shown and intact, (e and f) an axial section view of the shoulder, and blue arrows indicate the rotator cuff attachment site

shoulder-related pathologies are not considered, we think that a good physical examination should be performed, and the source of the pain should be investigated with additional imaging studies. Although it is said that surgical treatment is reasonable in symptomatic patients in the long term, we think that the existing anatomy, adapted with analgesia and additional rehabilitation methods, should not be disturbed.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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