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CASE REPORT

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Bilateral temporal spinous projections overshadowing the sphenoidal spines: an anatomical and radiological evaluation

V. Mehta, J. Arora, R.K. Suri, G. Rath

Department of Anatomy, Vardhaman Mahavir Medical College and Safdarjung Hospital, New Delhi, India

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The infratemporal fossa has traditionally been described as a post-maxillary space, which is open below, to the rear and laterally. The most reliable osseous landmarks of the infratemporal and parapharyngeal spaces are the pterygoid and styloid processes and the sphenoidal spine. In the present study the skull exhibited the normal sphenoidal spines along with a prominent spinous projection emanating bilaterally from the tympanic plate of the temporal bone. The objective of the present paper is to report an anatomical and radiological evaluation of the sphenoidal spines coexistent with bilateral temporal spinous projections. Additionally, the topographical relationship of this osseous variation is discussed with particular reference to neurovascular structures. Unduly prominent temporal spinous projections may cause obstruction, thus reducing the operative field. The anatomical variations relating to bony and vascular structures in this region are of paramount importance to neurosurgeons and otorhinolaryngologists. (Folia Morphol 2008; 67: 296–298)

Key words: temporal, sphenoidal spine, osseous, variant

INTRODUCTION

Varied surgical specialties, such as maxillofacial surgery, neurosurgery and otorhinolaryngology, necessitate a detailed and thorough knowledge of the anatomy of the infratemporal fossa [8]. A vast amount of data is available on the types of approach utilised for negotiating the infratemporal fossa [6].

A wide variety of neoplasms involving the skull base have now been identified and the combined efforts of the neurosurgeon and otorhinolaryngologist are required for a successful approach to this important and variable anatomical region [5]. Prominent and robust morphological osseous structures, such as the sphenoidal spine and the pterygoid and styloid processes, may occasionally complicate the classical trans-zygomatic infratemporal approach [4]. If unduly prominent, these reliable anatomical landmarks may cause obstruction, narrowing the operative area. Moreover, in-depth knowledge of the anatomical peculiarities in the infratemporal fossa is vital for accurate orientation in the interpretation of computed tomography and magnetic resonance imaging scans.

CASE REPORT

We detected an osseous variation in a dry human skull specimen of an adult male of Caucasian race during the course of routine scanning of bones in the osteology section of the department (Fig. 1). A prominent spinous projection emanating from the tympanic plate of the temporal bone was observed bilaterally. These projections were conical in shape and measured 5 mm and 6 mm in length on the left

Address for correspondence: Dr. V. Mehta, Asst. Prof., Vardhaman Mahavir Medical College and Safdarjung Hospital, New Delhi, India, e-mail: drvandanamehta@gmail.com; gayatrirath@rediffmail.com

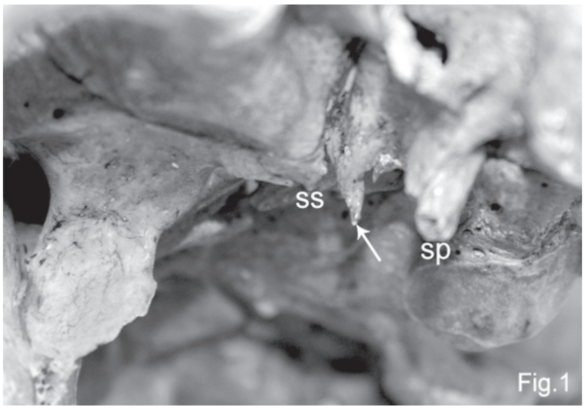

Figure 1. Lateral view of the left infratemporal region depicting the osseous structures. The white arrow shows the spinous projection of the temporal bone; ss — spine of the sphenoid, sp — styloid process.

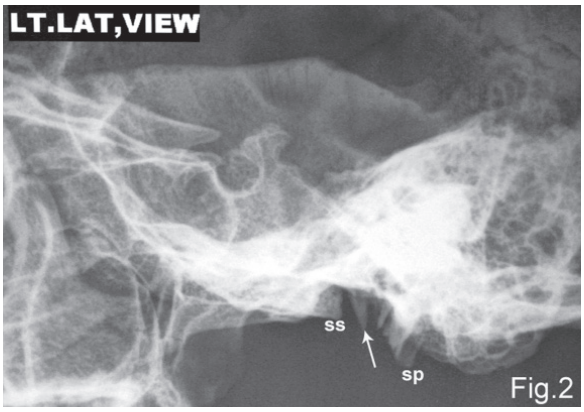

Figure 2. Left lateral view of a radiograph of the infratemporal region showing the osseous structures. The white arrow shows the spinous projection of the temporal bone; ss — spine of the sphenoid, sp — styloid process.

Table 1. Distance of temporal spinous projection (TS) from specific osseous landmarks in the skull base

Anatomical relationship	Distance [mm]	
	Right	Left
TS-spine of sphenoid	3	4
TS-styloid process	12	13
TS-tubercle of root of the zygoma	29	30
TS-pharyngeal tubercle	28	28

and right sides respectively. We also carried out a biometric assessment of the location of the temporal spines with reference to specific osseous landmarks (Table 1).

A lateral view skigram was also obtained of the same skull to demonstrate the radiological features of these bony variations, thereby ascertaining that a pre-operative radiological assessment is mandatory to identify such variants. Further, the skigram substantiated the observations noted in the dry skull specimens (Fig. 2).

DISCUSSION

Surgeons operating on the skull base commonly employ an explorative trans-zygomatic infratemporal approach [2]. Anatomical peculiarities in the form of osseous, fibrous and muscular variations significantly narrow the operative field. New terminology proposed for the infratemporal fossa has been the pterygomaxillary region [7].

Infratemporal fossa approaches in lesions of the skull base were introduced by Fisch and Pilsbury [3]. The foramen spinosum and spine of the sphenoid prove to be useful landmarks in this case. In the present study the apex of the tympanic plate near the medial end of the squamotympanic fissure has given off a spinous projection, which is much more prominent than the sphenoidal spine.

Crucial anatomical structures are related and attached to the sphenoidal spine. The chorda tympani nerve is known to emerge through the petrotympanic fissure and subsequently travels in a groove on the medial aspect of the spine of the sphenoid, later to join the lingual nerve. The spine of the sphenoid is related laterally to the auriculotemporal nerve.

The prominent tympanic spinous projection detected in the current study may lead to mistaken identification by the surgeon, who may miss the usual spenoidal spine. Thus the surgeon operating on the skull base may overlook the important relationship of the sphenoidal spine to the chorda tympanic and auriculotemporal nerves.

Another anatomical landmark considered important in surgical approaches to the tympanum is the Eustachian Tube [1]. The temporal spinous projections may also possibly encroach on the walls of the auditory tube, thereby distorting its topography.

The tympanic part of the temporal bone is formed in the mesenchyme, homologous with the os angulare, part of the composite lower jaw of reptiles and fish, and is integrated into the skull and adapted to form part of the tympanic cavity and to support the tympanic membrane.

Presumably, the temporal spinous projection encountered in the present investigation could be attributed to an excessive proliferation of cells during the course of intramembranous ossification in the tympanic part of the temporal bone. In the event of a space-occupying lesion such as a tumour, important anatomical structures may be displaced or compressed against the spinous projections [9]. The detection of these osseous variants through radiological procedures could certainly enable them to serve as important landmarks for maxillofacial surgeons. Interpretation of computed tomography and magnetic resonance imaging scans prior to surgery helps in identification and orientation of these morphological structures.

Ludinghausen et al. [4] carried out detailed and extensive research on the morphological peculiarities of the infratemporal fossa in advanced age. They reported in two cases, a unilateral presence of a duplicated spine wherein the anterior part represented a regular sphenoidal spine and the posterior process constituted part of the vagina processus styloidei. However, in our study, the temporal spinous projection was independent of the sheath of the styloid process, although it belonged to the tympanic plate of the temporal bone. Moreover, the spinous projection was detected bilaterally in the present specimen. Interestingly, this spinous projection from the temporal bone was found to be far more prominent than the sphenoidal spine.

As anatomists, we are of the opinion that the osseous projection described in the present investigation may not only constitute a puzzle for radiologists but may also form an unexpected obstacle for neurosurgeons operating over the skull base.

CONCLUSIONS

It is extremely important to create and reinforce awareness of osseous variations amongst radiologists and neurosurgeons working in the infratemporal fossa. The unexpected occurrence of these structures may prolong surgery, causing increased risk to the patient. An accurate knowledge of the vital morphological structures, together with their topographical relationships, is, understandably, of great significance to skull base surgeons.

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