An Anatomical study of the Pterygo-Alar Bar and Porus Crotaphitico Buccinatorius

K. Kalyan chakravarthi*1, K. Sarath Babu2

Lecturer1, Department of Anatomy,
Dr. Pinnamaneni Siddhartha Institute of Medical Sciences & Research Foundation, Chinnaoutpalli, Gannavaram Mandal, Krishna District (AP), INDIA. 521286.

Lecturer2, Department of Pharmacology,
Karpaga Vinayaga Institute of Medical Sciences and Research Center, Palayanoor, Madhurantakam, Kanchipuram, Tamil Nadu.

ABSTRACT

Pterygoalar bar is the name given to ossified pterygoalar ligament which forms a foramen known as porus crotaphitico buccinatorius with posterior border of lateral pterygoid plate. The present study was undertaken to observe the incidence of the Pterygo-Alar Bar and Porus Crotaphitico Buccinatorius in the adult human dry skulls and also to review the literature regarding these anatomical variations. This study was carried out on 71 dry human skulls at Dr. Pinnamaneni Siddhartha institute of medical sciences & research foundation Gannavaram; Krishna Dist; A.P. Our results demonstrate a total incidence of 28.2%, 5.63% skulls with complete bilateral presence of ossified pterygoalar ligament and porus crotaphitico buccinatorius, 14.08% skulls with unilateral presence of ossified pterygoalar ligament and porus crotaphitico buccinatorius, 8.45% skulls with incomplete unilateral presence of pterygoalar bar and porus crotaphitico buccinatorius. The ossified pterygoalar ligament is a major cause of the entrapment of the lingual nerve or a branch of the mandibular nerve and may cause mandibular neuralgia. Such anomalous bony obstructions could interfere with transcutaneous needle placement into the foramen ovale or distort anatomic relationships during approaches to the cranial base. The knowledge of detailed anatomy of the ossified pterygoalar ligament and porus crotaphitico buccinatorius can increase the success of diagnostic evaluation and surgical approaches to the region.

KEYWORDS: Foramen ovale, porus crotaphitico buccinatorius, ossified pterygoalar ligament.
INTRODUCTION

Disordered calcification or ossification of cartilage and ligaments occurs commonly amongst the elderly, yet the reasons for this are very poorly understood. The ossification of ligamentous structures in various parts of the body is frequently observed. This may result in a clinical problem such as compression to neighbouring structures or complications in the regional surgery. Various ligaments present in the skull base are of clinical and surgical importance. Among them, the pterygospinous and pterygoalar ligaments are located close to the foramen ovale and maintain an important clinical relationship with this structure.

The pterygospinous ligament extends from the pterygospinous process of the lateral lamina of the pterygoid process of the sphenoid bone, coursing inferior level of the oval foramen, to the spine of sphenoid bone in the infratemporal fossa [1]. The pterygoalar ligament extends from the pterygospinous process of the lateral lamina of the pterygoid process to the infratemporal surface of the sphenoid bone or its greater wing and was not connected to the sphenoid spine which forms a foramen known as porus crotaphitico-buccinatorius with posterior border of lateral pterygoid plate. The absence of anatomic data on normal variation of the pterygoalar ligament, its ossification and porus crotaphitico buccinatorius is a severe deficiency of modern anatomy textbooks.

The lateral pterygoid plate forms an important landmark for mandibular anesthesia and any anomalies at the posterior border of lateral pterygoid plate is bound to confuse anesthetists. The pterygoalar ligament was thicker, forming a bone bar that obliterated the foramen ovale. This foramen porus crotaphitico buccinatorius was termed as porus crotaphitico buccinatorius by Hyrtl [2]. Pterygoalar bar is the name given to an ossified pterygo-alar ligament by Chouki and Hodes [3]. It is reported to be present in 2.35% right side and 2.9% left side of skulls but its bilateral presentation is seen only in 0.89% of skulls.

The foramen crotaphitico-buccinatorium provides passage for some of the motor fibres of the trigeminal nerve (i.e. the masseter nerve) and deep temporal nerves [4]. Partial or complete ossification of pterygoalar ligament is important from an anatomical, anthropologic and clinical point of view, especially with respect to treatment of trigeminal neuralgia [5, 6, 7]. Therefore, the aim of this study was to investigate the incidence of the pterygoalar bony bridges and the foramen crotaphitico-buccinatorium in the adult dry human skulls and discuss its clinical implications.

MATERIALS AND METHODS:

Examination of the pterygoalar bar and a foramen known as porus crotaphitico buccinatorius was performed on 71 dry human skulls at Dr. Pinnamaneni Siddhartha institute of medical sciences & research foundation (Dr. PSIMS & R.F) Gannavaram; Krishna Dist; A.P (INDIA). Out of these 40 were full skulls and 30 were half skulls (skulls without calvaria). The base of the skulls were macroscopically inspected and it was recorded whether the pterygoalar bar was unilateral or bilateral and whether it was complete or incomplete.

RESULTS

For the present study, 71 dry human skulls were observed. Fifty one (71.8%) of the skulls had neither complete nor incomplete ossified pterygoalar ligament. Twenty skulls (28.2%) had pterygoalar ligament either in the form of complete or in the form of partial ossified pterygoalar ligament. Bilateral Complete pterygoalar bar and porus crotaphitico buccinatorius was found in 4 skulls (5.63%), unilateral complete pterygoalar bar and porus crotaphitico buccinatorius was found in 10 skulls (14.08%) and incomplete pterygoalar bar and porus crotaphitico buccinatorius was observed in six skulls (8.45%), (Graph-1).
Among four skulls having bilateral complete ossified pterygoalar ligament, 2 skulls had the thicker ossified pterygoalar ligament (Fig-2).

Graph-1: showing the percentage of complete or partial ossified pterygoalar ligament.

Category1- Normal skulls [71.8%]; Category2- Incidence of complete or partial ossified pterygoalar ligament [28.2%]; Category3- Incidence of bilateral complete pterygoalar bar and porus crotaphitico buccinatorius [5.6%]; Category4- Incidence of unilateral complete pterygoalar bar and porus crotaphitico buccinatorius [14.08%]; Category5- Incidence of unilateral incomplete pterygoalar bar and porus crotaphitico buccinatorius [8.45 %].

Figure-1: Base of the skull showing complete bilateral pterygoalar bar and Porus Crotaphitico Buccinatorius

PAB- Pterygoalar bar; PCB- Porus (Foramen) Crotaphitico Buccinatorius; GS- Infratemporal surface of greater wing of the sphenoid bone; LP- Lateral lamina of the pterygoid process of the sphenoid bone.
DISCUSSION:

Trigeminal neuralgia is caused by nerve or microvascular compression in 80% of cases and by other factors such as bone anomalies in the skull base in the remaining 20% [8]. The completely ossified pterygoalar ligament and presence of porus crotaphitico buccinatorius is of great clinical importance. The incidence of these anatomical formations in the human population is less known and there is only scarce information on its morphology in the literature.

Patnaik et al. (2001) discovered a pterygoalar ligament arising from the upper posterior border of the lateral pterygoid lamina and growing backwards and laterally towards the greater wing of sphenoid bone [9]. According to Newton and Potts an ossified pterygospinous ligament can be an obstacle in a radiographically guided trigeminal ganglion blockage [10]. Ludinghausen et al. reported the incidence of complete pterygospinous bony bar as 1.85 % on cadaver and as 6 % on dry human skulls [11].

Antonopoulou et al. reported that incompletely ossified pterygospinous ligaments were determined in 25% of the skulls, complete ossified pterygospinous bridge were determined in 2% of the skulls, bilaterally [12]. But in our study we found rare bilateral complete ossified pterygoalar ligament and porus crotaphitico buccinatorius in 4 skulls (5.63%) [Fig-1 & 2], unilateral complete pterygoalar bar and porus crotaphitico buccinatorius was found in 10 skulls (14.08%) [Fig-3 & 4].
Figure-3: Infratemporal fossa on the left side of skull showing complete pterygoalar bar and Porus Crotaphitico Buccinatorius

Figure-4: Base of the skull showing complete (left) and partial (right) pterygoalar bar and Porus Crotaphitico Buccinatorius

PAB- Pterygoalar bar; PCB- Porus (Foramen) Crotaphitico Buccinatorius; GS- Infratemporal surface of greater wing of the sphenoid bone; LP- Lateral lamina of the pterygoid process of the sphenoid bone.
Interestingly in bilateral complete ossified pterygoalar ligament (4 skulls (5.63%)), 2 skulls had the thicker ossified pterygoalar ligament [Fig-2]. This type of variation has very important clinical significance due to the thicker ossified pterygoalar ligament forms a bar and obliterates the foramen ovale, which may cause mandibular neuralgia.

Suazo Galdames et al. reported the incidence of complete and incomplete ossification of the pterygoalar ligament 3.84 and 22.43%, respectively [13]. Kapur et al. obtained a lower prevalence of 1.31% of complete pterygospinous ligament ossification, from a sample of 305 Croats’ skulls [14]. Nayak et al. analyzed 416 Indian dried skulls; 9.61% of the samples presented the pterygospinous bony bridges, of which 5.76% was complete and 3.84% was incomplete [15]. Peker et al reported the presence of pterygoalar bar in 8.8% in skulls of an Anatolian population [16]. But in our study we found complete ossified pterygoalar ligament and porus crotaphitico buccinatorius in 14 skulls (19.72%), and incomplete ossified pterygoalar ligament and incomplete porus crotaphitico buccinatorius was found in six skulls (8.45%) [Fig-4]. However, these osseous variations are important not only in anatomy, but also in clinical practice. Pterygoalar ligament may compress the branches of mandibular nerve and may cause chewing disorders, pain, numbness of the buccal region and changes to the parotid gland salivation [16]. Krmpotic-Nematic J et al. stated that the pterygoalar ligament can potentially press on the deep temporal, the lateral pterygoid, buccal nerves and on branches of the auriculotemporal nerve [17]. Ossified pterygoalar ligament may compress the chorda tympani nerve or lingual nerve, results in loss of taste and anaesthesia in the anterior two-thirds of the tongue.

Therefore, the anatomical knowledge of ossified pterygoalar ligament and presence of porus crotaphitico buccinatorius may be beneficial for medical practitioners in cases of trigeminal neuralgia, anesthetists, dental and maxilla-facial surgeons in day to day clinical practice.

REFERENCES:


*Corresponding author: K. Kalyan chakravarthi
E-mail: kalyankosuric@gmail.com