ESTIMATING THE PREVALENCE AND VARIOUS TYPES OF BIFID MANDIBULAR CANAL USING DIGITAL OPG: A RETROSPECTIVE STUDY

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Abstract:
Objective: - This Study Estimated The Prevalence Of Bifid Mandibular Canals In Patients, Who Underwent Opg Investigation In Tagore Dental College And Hospital..
Method: - The Study Sample Comprised Of 1000 Digital Orthopantomograms (Opgs) Which Were Gathered From Tag oredental college and hospital. Each radiograph was assessed for bmc based on the Classification Given By Rp Langlais.
Results: - There Were 1000 Opgs Examined, Out Of Which 450 Were Of Women And 550 Were Of Men. Bifid Mandibular Canals Were Observed In 73 Out Of 1000 Digital Panoramic Images.
There Was No Statistically Significant Correlation Found With Regard To Age. Bifid Mandibular Canalswerefoundwithamale-Tofemaleratioof1:1.43.The most frequently encountered type Of Bmc Was Type I (72.6%) Followed By Type Ii (21.9%)
Conclusion: - The Study's Findings Indicate That 7.3% Of People Have Bmc. To Reduce The Risk Of Problems, Clinicians Should Carefully Check For The Existence Of Bmc Before Performing Any Mandibular Surgery.

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INTRODUCTION:

A single bilateral morphologic feature known as the mandibular canal is made up of the intraosseous path that connects the mandibular foramen and the mental foramen. This canal guards a crucial neurovascular bundle that supplies the lower teeth, lower lip, surrounding bone, gingiva, and mucosa with blood and sensitive activity. Medical literature describes morphological differences of the mandibular canal, particularly bifurcations. Dry mandibles were employed by Kiersch and Jordan, Patterson and Funke, and others in 1973 to conduct the first studies on bifid mandibular canals. Several writers have identified the presence of bifid mandibular canals using extraoral panoramic radiographs[1].The incidence has been variably reported as 0.08%, 0.4%, and 0.9%.The incomplete fusion of three inferior dental nerves during embryogenesis is a suggested cause for the formation of BMC[2]. This variation in neuroana-tomy may be a reason behind the local anaesthesia failure during inferior alveolar nerve block.

Locating the mandibular for a men and the passage of the mandibular canal from the mandibular for a men to the mental for a men is made simple by the identification of BMCs. In particular, the identification of this potential variation with the mandibular canal will allow the clinician to modify the surgical technique.

Thus, the present study aims to detect the prevalence of bifid mandibular canals in adult patients, who underwent OPG investigation at Tagore dental college and Hospital, Rathina-mangalam, Tamil Nadu.

MATERIALS AND METHODS:

The study sample comprised of 1000 digital orthopantomograms (OPGs) which were gathered from Tagore dental college and hospital .Any digital OPGs, pathological or otherwise, with an age range of 18 to 80 years and a jepg or jpg image format were included; however, OPGs from surgical cases including hemimandi-bulectomy and blurred images in which the mandibular canal could not be identified were omitted from this study .According to the RPL anglaisetal. categorization, each radiograph was evaluated for BMCs. They categorised BMCs into four groups:

i. **TYPEI**—which consists of bilateral or unilateral BMC sex tending to third molar or immediate surrounding area,
ii. **TYPEII**—includes of bilateral or unilateral BMCs which extend along the course of main canal and rejoin it within the ramus or body of the mandible,
iii. **TYPE III**—consists of the first two categories combination, and
iv. **TYPEIV**—includes two separate mandibular for a men which joins to form single larger canal.

The criteria for BMC were two radiolucent lines and at least three radioopaque borders clearly seen on the image.

STATISTICALANALYSIS

Data was entered in Microsoft excel sheet (version2016) and subjected to statistical analysis in SPSS software version 27.0. Descriptive analysis was carried out to analyze the prevalence of BMC. Chi-square test was used to test the association between age, gender and BMC.

RESULTS:

Out of 1000 OPG examined, bifid mandibular canal (BMC) was observed in 73 OPG's constituting the prevalence of 7.3%. Out of 73 BMC cases, 30 (41.1%) was observed in males and 43 (58.9%) in females with a male to female ratio of 1:1.43. BMC was observed more commonly in left side (75.3%) with unilateral tendency (84.9%).Type 1(72.6%) was found to be most common followed by type 2 (21.9%) BMC.

Females tend to have higher percentage of BMC (Unilateral-49.3%andbilateral-9.58%) when com-pared to males.Type1 was found to be more common in both males (23.28%) and females (49.31%). Whereas, type 2 was found to be more common in males (15.06%) than females (6.84%)(Table2).Prevalence of BMC was more common in 20-30years age group(Unilateral–43.83%,bilateral-8.2)followed by31-40years age group(Table3).There is a decreasing curve/ trend in number of BMC cases as age advances (Graph 2). Test of significance: Chi-square test. $P<0.05$is considered significant (Table4and5) There exists no statistically significant difference (association) between age and gender with bifid mandibular canal ($p>0.05$).

DISCUSSION:

The inferior alveolar nerve, inferior alveolar artery, and inferior alveolar vein are located in the mandibular canal, which travels obliquely down-ward and forward in the ramus before moving horizontally forward in the body. Mandibular for a men is where it begins, and mental foramenis where it finishes.[1]The inferior mandibular nerve bundle has three distinct parts, according to Chavez Lomeli, which indicates that there are three distinct developmental domains in the mandibular dentition. These fields are innervated by several nerve branches that emerged from the central nervous system at various times and with various origins.[2]

A neuroanatomical normal variant that occasion-nally exists in the jaw is the bifid mandibular canal. Two mental for a min a were present in a case with unilateral BMC that Patters on and Funke documented in 1973. Similar to this, Kiersch and Jordan documented a case of a BMC that appeared radiologically.[3] The medial mandibular surface's imprint of the mylohyoid groove is one of the potential causes of a false BMC radiograph[4].The groove, which is located inferior to the mandibular foramen, provides way to the mylohyoid nerve, which splits off from the inferior alveolar nerve and proceeds to the mouth's floor. This nerve supplies the mylohyoid muscle and the anterior belly of the digastric muscle with motor supply. The origin of the mylohyoid muscle, or the mylohyoid ridge into the medial surface of the jaw, with a distribution parallel to the mandibular canal, may give a radiologic osteo condensation imaging of a bifid mandibular canal [5]. The presence of an internal and external oblique ridge in the OPG, which appear to be higher than the mandibular canal, may also be a cause of false BMC[6].

In a patient with a number of congenital abnormalities connected torubellasyndrome, Good day reported a duplicate mental foramen in 1988 while perform in gorthognathic surgery and directly verified the existence of two mental foramina and two mental nerves[7].Another study on the mandibular canal by Chavez Lomeli hypothesised that three inferior dental nerves may initially innervate three clusters of the mandibular teeth before fusing to create a single nerve during embryonic development. Bifid or trifidmandibular canal scan be explained by the partial fusion of these nerves[8].

In addition to examining the panoramic, cone beam CT (CBCT), and micro-CT from 40 dry mandibles for BMCs, M. S. Kim evaluated 1000 OPGs from dental patients. A stereoscopic and histological study of the cross-sectioned mandibles verified the findings. In panoramic radiographs, the author discovered four cases with BMC, indicating a frequency of 0.038%. Buta histological and stereoscopic analysis of a cross-section of a dry mandible revealed that just one channel had neurovascular bundles, while the others contained marrow fatty tissue. The authors came to the conclusion that when predicting whether or not BMCs would be present after mandibular surgery, extreme cautions hould beused[9].FourcasesofBMC0.08%werereported by Grover and Lorton when they analyzed panoramic radiography in US Army recruits[10].

From 1000 OPGs, we calculated the prevalence of BMCs in our study to be 2.3%. In the literature, a clinical implication of a BMC has been identified as a challenge while administering inferior alveolar nerve anaesthesia, particularly in individuals with type IV BMCs. The Gow-Gates technique or the vazirani-akinosi nerve block technique are typically used to administer an inferioral veolarner veb lockata little higher level in order to over cometh is issue. Additionally, the presence of BMCs has additional clinical ramifications that are crucial for mandibular surgeries including impacted third molar extraction, dental implant, fracture osteosynthesis, and sagittal split ramus osteotomy.

Failure to identify a BMC could lead to damage to the inferior alveolar nerve, which could cause paraesthesia, anaesthesia, traumatic neuroma, and bleeding during surgery, among other conse-quences. In situations of BMCs with branches reaching to the retromolar pad (type I), patients with a mandibular prosthesis and loss of alveolar bone close to the retromolar pad may experience pain due to pressure on the neurovascular bundle. Because of this, recognising this potential abnormality will enable the doctor to change the prosthetic design[2,8,11].

The study is limited by the fact that OPGs are a 2D image of a 3D object, resulting in the superimposition of anatomical components, and that an OPG cannot detect a canal's medial or lateral bifurcation. If a surgical procedure is required, it is advantageous to undergo 3D imaging.

CONCLUSION :

The study's findings indicate that 7.3% of people have BMC. To reduce the risk of problems, clinicians should carefully check for the existence of BMCs before performing any mandibular surgery.

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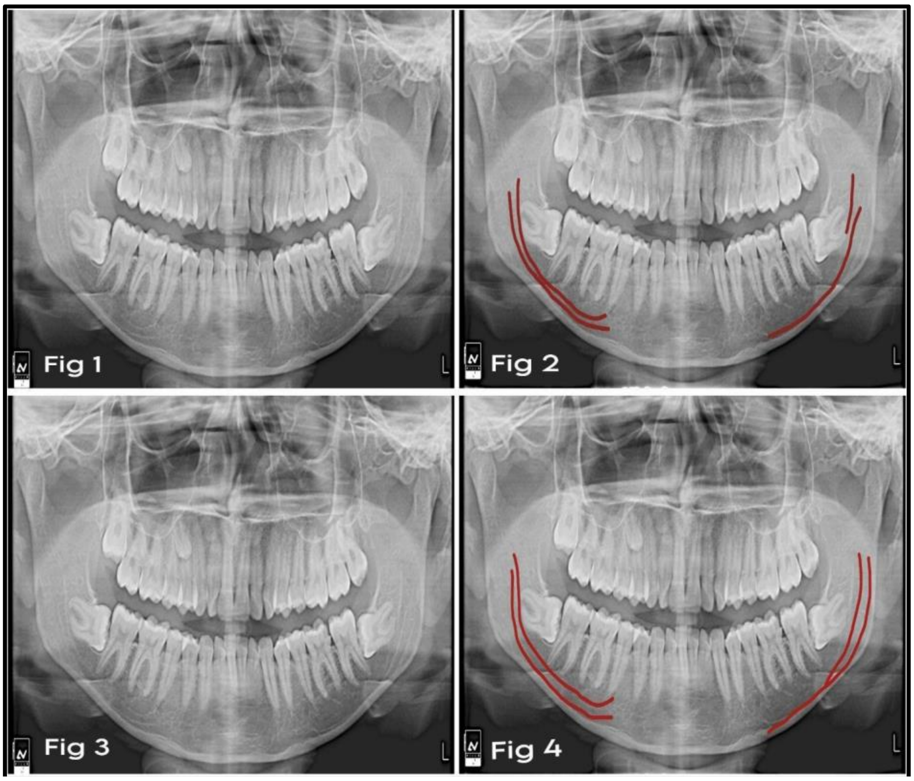


Fig.1&Fig.2 Type1BMC Fig.3&Fig.4Type2BMC

Prevalence and types of Bifid mandibular canal(BMC)in1000OPGs.

Table 1: Descriptive statistics of study variables

		N	%
Age	Mean±SD (years)	32.84±10.462	
Age category	20-30 years	38	52.1
	31-40 years	20	27.4
	41-50 years	9	12.3
	>51 years	6	8.2
Gender	Male	30	41.1
	Female	43	58.9
Bifid mandibular canal	**Total**	**73**	**7.3**
	Left	55	75.3
	Right	29	39.7
	Unilateral	62	84.9
	Bilateral	11	15.1
BMC type	Type1	53	72.6
	Type2	16	21.9
	Type3	3	4.1
	Type4	1	1.4

Table2-Gender distribution of Bifid mandibular canal.

Gender	BMC left N(%)	BMC right N (%)	Unilateral BMC N (%)	Bilateral BMC N (%)	BMC type1 N (%)	BMC type2 N (%)	BMC type3 N (%)	BMC type4 N (%)
Male	24(32.8)	10(13.69)	26(35.6)	4 (5.47)	17(23.28)	11(15.06)	2(2.73)	1(1.36)
Female	31(42.4)	19(26.02)	36 (49.3)	7 (9.58)	36(49.31)	5(6.84)	1(1.36)	0 (0)

Table3- Age distribution of Bifid mandibular canal.

Age category	BMC left N (%)	BMC right N(%)	Unilateral BMC N (%)	Bilateral BMC N (%)	BMC type1 N (%)	BMC type2 N (%)	BMC type3 N (%)	BMC type4 N (%)
20-30 years	31 (42.4)	13 (17.8)	32 (43.83)	6 (8.2)	27 (36.98)	9 (12.3)	1 (1.36)	1 (1.36)
31-40 years	14 (19.17)	10 (13.69)	16 (21.9)	4 (5.47)	14 (19.17)	4 (5.47)	2(2.73)	0 (0)
41-50 years	6 (8.2)	4 (5.47)	8 (10.9)	1 (1.36)	6 (8.2)	3 (4.1)	0 (0)	0 (0)
>51 years	4 (5.47)	2 (2.7)	6 (8.2)	0 (0)	6 (8.2)	0 (0)	0 (0)	0 (0)

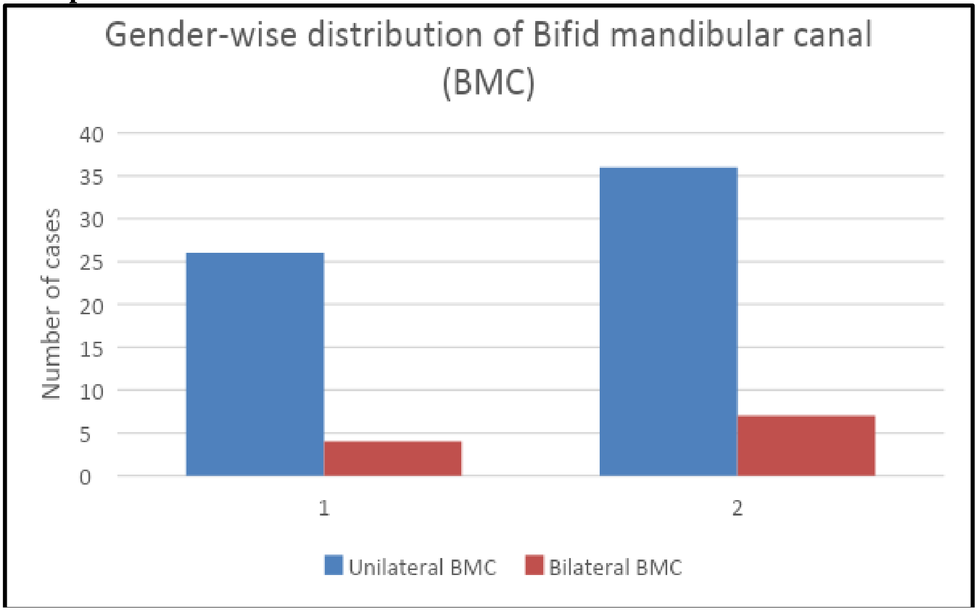
Table4-Association between gender and Bifid mandibular canal

Gender	Unilateral BMC	Bilateral BMC	p-Value
Male	26 (86.7)	4 (13.3)	0.729
Female	36 (83.7)	7 (16.9)	

Table5-Association between age and Bifid mandibular canal

Age category	Unilateral	Bilateral	p-value
20-30 years	32 (84.2)	6 (15.8)	0.666
31-40 years	16 (80)	4 (20)	
41-50 years	8 (88.9)	1 (11.1)	
>51 years	6 (100)	0 (0)	

Graph 1: Gender distribution of unilateral and bilateral Bifid mandibular canal.



Graph 2: Age distribution of unilateral and bilateral Bifid mandibular canal