

Prevalence of bifid and trifold mandibular canal by panoramic radiograph at RSGM Unsyiah Banda Aceh: data from April 2012 to March 2017

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ABSTRACT The mandibular canal bifid and trifold are variations of the mandibular canal. This variation of the mandibular canal is essential to recognize in surgical procedures involving mandibles, such as extraction of impacted third molars, dental implant treatment, and sagittal split ramus osteotomy. The purpose of this study was to determine the prevalence of bifid and trifold mandibular canal by panoramic radiograph at RSGM Unsyiah Banda Aceh. This research method is descriptive by collecting secondary data in the form of panoramic images from patients visiting RSGM Unsyiah Banda Aceh for April 2012-March 2017. A total of 2,478 panoramic radiograph photos collected showed the bifid mandibular canal is 1.25%. Based on sex, 21 photos (67.74%) of the bifid mandibular canal cases in women and ten photos (32.26%) in men. Based on the position of the bifid mandibular canal, 9 images (29.03%) unilateral/ right-sided, 15 photos (48.39%) were unilateral/left side, and seven photos (22.58%) bilateral.

KEYWORDS: bifid mandibular canal, panoramic, prevalence, trifold mandibular canal

INTRODUCTION

Tooth loss is still a significant problem of oral health worldwide.¹ The results of the Basic Health Research (RISKESDAS) in 2013 showed that the national prevalence of oral and dental issues in Indonesia reached 25.9%.² The 2007 RISKESDAS mentions that the percentage of people who received filling and extraction treatment was 38.5%.³ According to Wita Puspitasari (2008), the reason for most tooth extraction is caries with a percentage of about 37%, followed by impacted teeth, which is the second reason with a rate of around 33%. (Cit. Hardadi, 2013).⁴ The teeth most often affected by caries are permanent first molars. 70% of the affected teeth have to be extracted,⁵ while the most frequently impacted teeth are the third molars.⁶

Tooth extraction is a medical procedure that requires some preparation in advance. Dentists are required to deal with pain in patients during tooth extraction, namely by providing anesthesia.⁷ The presence of pain during extraction can be caused by

inadequate anesthesia and is known to be the most common problem due to tooth extraction. The failure of anesthesia is caused due to poor anesthetic technique, acute infection, inability to insert the needle in a suitable location, low pain threshold or anatomical variations.⁸ One of the anatomical variations associated with this failure is the location and configuration of Multiple mandibular canals.⁹

The Anatomical variations of the mandibular canal are known in the form of the bifid mandibular canal (BMC) and the trifold mandibular canal (TMC) (Figure 1 A and B).¹⁰ These mandibular canal variations are essential to know in surgical procedures involving the mandible such as extraction of impacted third molars, dental implant treatment and sagittal split ramus osteotomy.⁹ The diagnosis of this variation can be confirmed using panoramic radiographs.¹⁰ Variations in the normal tract anatomy of BMC and TMC have been reported with an incidence ranging from 0.08% to 65.0%.¹¹

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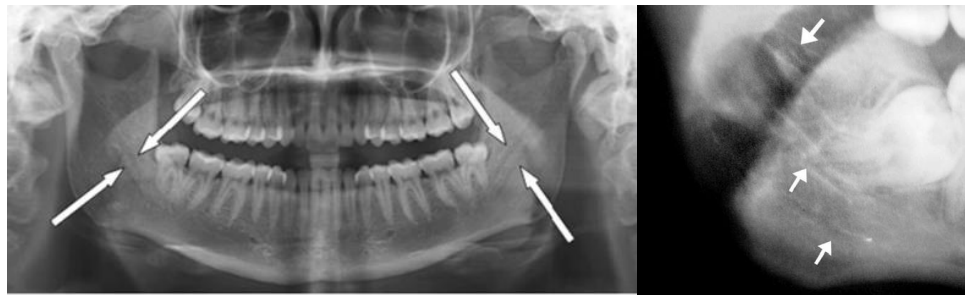


Figure 1. Panoramic Radiographs Bifid Mandibular Canal (A) and Trifid Mandibular Canal (B)

Based on these problems, research is needed to determine the prevalence of bifid and trifid mandibular canals using panoramic radiographs at RSGM Unsyiah Banda Aceh from April 2012 to March 2017. This research was conducted at RSGM

Unsyiah Banda Aceh because this hospital is a teaching hospital for dental students who were handling various dental and oral problems with the support of radiology installation facilities to store data for conducting this research

MATERIALS AND METHODS

This research was conducted at RSGM Unsyiah Banda Aceh in July 2017. The research sample was all panoramic radiograph photos of the bifid mandibular canal (BMC) and trifid mandibular canal (TMC) cases at RSGM Unsyiah Banda Aceh for the period April 2012-March 2017. The collection method The sample was carried out by using the purposive sampling technique and based on inclusion criteria in the form of panoramic radiographs of patients aged ≥ 20 years. The exclusion criteria were patient age <20 years and panoramic photographs of patients with low quality. The instrument used was panoramic x-ray:

Planmeca Promax (Finland). The materials in this study were all panoramic photographs of patients at RSGM Unsyiah Banda Aceh for the period of April 2012-March 2017.

Each panoramic photo is observed by looking at the mandibular canal with BMC and TMC branches with a radiolucent zone in the form of a strip between two radiopaque lines with different branching types. The data were processed and analyzed manually to determine the prevalence of BMC and TMC. The data that have been obtained are processed and presented in tables and percentages.

RESULTS

The results of this study obtained 2,478 panoramic photos of patients aged ≥ 20 years at RSGM Unsyiah Banda Aceh from April 2012 to March 2017. A

total of 31 cases were mandibular canal bifid, and 0 points were for mandibular canal trifid. The results of this research shown in **Table 1**.

Table 1. Prevalence of Bifid and Trifid Mandibular Canal at RSGM Unsyiah Banda Aceh

No.	Case	Amount	Percentage (%)
1.	Bifid mandibular canal	31	1.25
2.	Trifid mandibular canal	0	0
3.	Unbranched	2,447	98.75
Total		2,478	100

Table 1 shows that from 2,478 patients, 31 patients (1.25%) had mandibular canal bifid cases, 0

(0%) mandibular canal trifid cases, and 2,478 unbranched cases (98.75%).

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Panoramic data for 2,478 patients showed that there were 32.26% cases of the bifid mandibular canal in men

and 67.74% in women. The distribution of data based on the sex criteria shown in **Table 2**:

Table 2. The distribution of Prevalence of Bifid Mandibular Canal based on sex criteria

No.	Sex	Amount	Case	Percentage (%)
1.	Male	1,098	10	32.26
2.	Female	1,380	21	67.74
Total		2,478	31	100

The data showed there were 9 of 31 patients (29.03%) who had bifid mandibular canal located unilateral/ right side, 15 patients (48.39%) located unilateral/ left side and seven patients (22.58%)

located simultaneously bilaterally. The prevalence data of the mandibular canal based on the location shown in **Table 3** below:

Table 3. The distribution of Prevalence of Bifid Mandibular Canal based on sex criteria

No.	Case	Amount	Percentage (%)
1.	Unilateral/Right side	9	29.03
2.	Unilateral/ Left side	15	48.39
3.	Bilateral	7	22.58
Total		31	100

DISCUSSION

Tooth extraction is a medical procedure that requires several preparations, including the dentist trying to deal with pain by giving anesthetic to the patient during tooth extraction.⁷ Pain during extraction can be caused by inadequate anesthesia and is the most common problem as a result of the extraction of the tooth. Anesthesia failure can be due to poor anesthesia, acute infection, inability to insert the needle in a suitable location, or anatomical variations.⁸ One of the anatomical variations that can be associated with this failure is the location and configuration of the mandibular canal that varies. Mandibular canal anatomical variations can be in the form of the bifid mandibular canal (BMC) and the trifid mandibular canal (TMC).¹⁰ These mandibular canal variations are essential to know in surgical procedures involving the mandible, such as extraction of impacted third molars, dental implant treatment, and sagittal split ramus osteotomy.⁹

Table 1 shows that from 2,478 panoramic photos at RSGM Unsyiah Banda Aceh in the period April 2012-March 2017, 31 patients had BMC cases (1.25%), no (0%) TMC cases, and 2,447 (98.75%) branching cases were found. This data results are in line with research conducted by Kasabah (2013), which stated that there were 41 cases (0.98%) of the 4200 radiographs studied. 0.08% to 0.95%. (Cit. Bogor et al., 2006).¹⁰

Based on research using cone-beam computed tomography (CBCT), the prevalence of BMC ranges from 15.6% to 65% (cit. Naitoh et al. 2009).¹⁰ Rashsuren's (2014) study showed that BMC was found in 22.6% of the 500 patients studied.⁹ This indicates that in the CBCT study, a higher incidence of BMC was found compared to studies using panoramic radiographs.¹² CBCT images produce three-dimensional images that are accurate and can provide images up to the smallest and adequate size.¹³ Besides, CBCT has a high image resolution to be able to show the mandibular canal image directly compared to the image generated from panoramic radiographs.

Table 2 explains that based on the sex of BMC cases, most often occur in women than men, and the data results show that there were 31 cases of BMC with panoramic photos at RSGM Unsyiah Banda Aceh in the period April 2012-March 2017, with details of 10 cases (32.26%) occurred in men and 21 cases (67.74%) in women. According to Orhan's¹² study, BMC was found in 88 cases in women (54.7%) and 73 in men (45.3%). Other studies conducted by Rashsuren also showed no significant difference in prevalence. BMC by sex difference, namely female 52 patients (46.0%) and male 61 patients (54.0%).⁹ Besides, the results of Shokri's study showed the prevalence of BMC separated by sex, namely

women 15 patients (65.2%) and male eight patients (34.8%).¹⁴ The results of this panoramic photo data show that the prevalence of BMC is more found in women than men, but the differences found are not significantly different.

Previous studies indicate that mandibular canal bifid tends to occur in women; only Rashuren's⁹ research shows that it tends to occur in men. However, the relationship between sex and BMC participation did not have a significant relationship. Kasabah¹⁵ research indicates that there is no significant difference between the prevalence of BMC and sex. The variation in incidence found among researchers can be caused by differences in population and sample sizes in each study as well as the type of inspection being performed.¹⁴

Based on the location, the result shows that out of 31 cases of BMC, 9 cases (29.03%) were located unilateral/ right side, 15 cases (48.39%) were located unilateral/ left side, and 7 cases (22.58%) were located bilaterally. According to a study conducted by Freitas et al.¹⁶ using CBCT images, it shows that of the 90 cases of BMC that were found, more occurred bilaterally, 39 cases (43.3%), 29 cases (32.2%) were located unilateral/left side. 22 cases

(24.5%) were located unilateral/ right side. Another study reported using orthopantomograms (OPGs) with a research sample of 5800 found 139 cases of BMC based on location. 26 cases (19.3%) were located unilateral/ left side, 29 cases (21.5%) were located unilateral/ right side, and 80 cases (59.3%) were bilateral.¹⁷ Whereas in the study of Lorenzo et al.¹⁸ it was found 83 cases of BMC with results based on the location, namely found 24 cases (28.9%) located unilateral/ left side, 39 cases (46.9%) located unilateral/ right side, and 20 cases (24.2%) located bilaterally.

This difference in location can occur due to the type of inspection carried out in the study. This study was conducted using panoramic radiographs, while other studies used CBCT and OPGs. The incidence of BMC obtained using CBCT is higher than that obtained using panoramic radiograph images.¹⁴ CBCT results can provide a three-dimensional image with high resolution and can detect accessory channels with the narrow diameter, diffuse in all directions. With advances in technology and improving image quality as a diagnostic tool, the number of anatomical variations in the mandibular canal tends to increase significantly.¹⁹

CONCLUSION

The prevalence of bifid mandibular canal using panoramic radiographs at RSGM Unsyiah Banda Aceh for April 2012-March 2017 was 31 cases (1.25%), while no trifid mandibular canal was found.

Based on sex, issues of BMC at RSGM Unsyiah Banda Aceh for April 2012-March 2017 were more common in women than men and mostly located unilateral/ left side.

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