

Fusion between impacted distomolar and Third molar: A Rare case report with Review of Literature

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Abstract

Fusion of teeth is the developmental anomaly characterized by union of two or more developing adjacent teeth. Fusion can occur when two distinct tooth germs unite to create a single tooth connected by dentin and/or enamel, or when a permanent tooth fused with a supernumerary tooth.

This article presents a case of 32 years old male patient who reported to oral surgery clinic with chief complaint of pain and discomfort in the right molar region since one week. Intra oral periapical view and Orthopantomogram revealed an impacted right mandibular third molar (#48) fused with a distomolar tooth. The fused tooth was surgically extracted.

The purpose of this article is to present a case of fusion of mandibular distomolar to the third molar and discuss and review the past published literature regarding prevalence, etiologies, clinical presentation, differential diagnosis, diagnosis and treatment.

Case report (J Int Dent Med Res 2024; 17(4): 1731-1739)

Keywords: Fusion, Distomolars, Supernumerary teeth, Impacted Third Molars.

Received date: 14 October 2024

Accepted date: 23 December 2024

Introduction

Supernumerary teeth are teeth that are present in addition to the normal set and are seen in all quadrants of the jaw, most often in the upper jaw¹⁻³. Supernumerary teeth are more common in the permanent dentition and range in occurrence from 0.1% to 3.8%⁴. When the supernumerary tooth is distal to the most posterior tooth, it is called a distomolar and a paramolar if it erupts buccally or lingually to any molar⁵⁻⁶. Distomolars are fourth extra molars⁷. Distomolars are typically asymptomatic and only

discovered following routine imaging procedures^{5,8}.

Fusion, on the other hand, is the joining of two distinct tooth germs to form a single tooth united by dentin and/or enamel, whereas gemination is thought to be the result of the incomplete division of one tooth germ⁹. Distinguishing between fusion and gemination in cases of normal tooth with a supernumerary tooth can be challenging, if not impossible¹⁰. The frequency of fusion of a permanent tooth with a supernumerary tooth is less than 0.1% of cases, and happens more commonly in anterior maxillary teeth¹⁰⁻¹¹. Fusion of permanent posterior teeth is uncommon¹².

There are no exact explanations of how fusion occurs, but it appears to be a result of close contact between developing teeth brought about by physical forces or pressures exerted on them¹³.

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The prognosis for fused teeth is usually poor since they can lead to clinical problems such as periodontal disease, increased risk of caries, and delayed or ectopic tooth eruption, in addition to aesthetic disappointment.¹⁴ Few occurrences of mandibular third molar and distomolar fusion have been documented in the literature. Unfortunately, due to their aberrant crown morphology, the majority of these fusions needed to be surgically removed¹⁵.

The aim of this case report is to describe the rare incidental finding of a mandibular third molar fused to a distomolar and to discuss the incidence, etiology, clinical features and management in such cases.

Case Report

A 32 years old male patient reported to oral surgery clinics, College of Dentistry; Jazan (KSA) with chief complaint of pain and discomfort in the mandibular right molar region since one week. The patient had no significant medical or dental history. On clinical examination, extra oral examination revealed nothing significant. On intra oral examination, there was a partially erupted mandibular right third molar with redness and swelling of pericoronal flap (pericoronitis). A small decayed cavity was present on the occlusal surface of the partially erupted crown.



Figure 1. Intraoral periapical view showing fusion of third molar with distomolar.

Intra oral periapical view (Figure 1) and Orthopantomogram (Figure: 2) revealed an impacted right mandibular third molar (48) fused with a distomolar tooth distally. It also revealed a large crown in relation to 48 and a radio-opaque distinct crown-like structure attached to the distal

surface of 48 and the distal crown-like structure appeared to have dentin- and enamel-like features. The two crowns were fused together and seemed to share the third molar's crypt. Although the roots were clearly distinct, suggesting that the fusion of a disto-molar and a single-rooted third molar contributed for the changed morphology. There was no peri-apical pathology present.



Figure 2. Panoramic radiography showing Double teeth in right mandibular region.



Figure 3. Buccal guttering performed for removal of 3rd molar fused with distomolar.

A provisional diagnosis of pericoronitis in relation to the third molar fused to supernumerary distomolar tooth was taken into consideration. After that, the required blood investigations were completed, and a surgical extraction schedule for #48 was set up. The patient was informed of the

surgical risks. After obtaining informed consent from the patient. Under local anesthesia, the inferior alveolar, lingual, and buccal nerves were anesthetized locally with 3% mepivacaine hydrochloride with 1:100,000 epinephrine.

To expose the tooth, a mucoperiosteum flap was reflected after an envelope incision with a releasing oblique incision on the medial side of the second molar. With a carbide flat fissure bur, the osteotomy was carried out (Figure 3). The fused tooth was surgically extracted using the buccal guttering technique. The tooth was gently extracted so as not to break the teeth's roots (Figure: 4). 3-0 black silk was used to close the mucoperiosteal flap (Figure: 5).



Figure 4. Image of fused molars (view: buccal, occlusal).

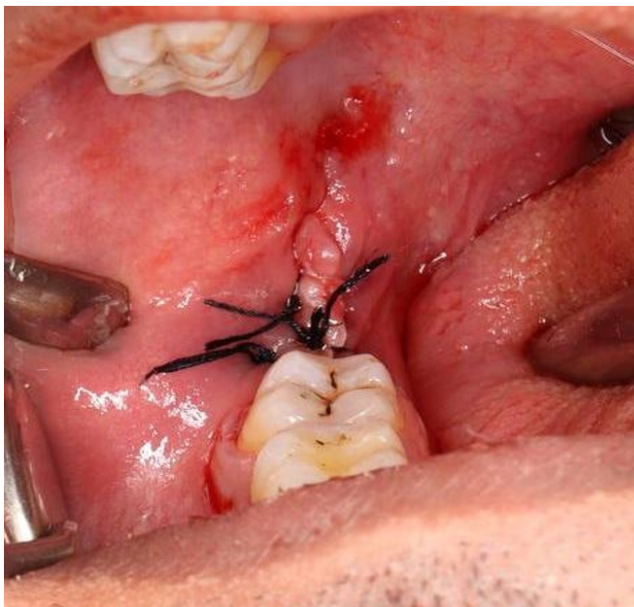


Figure 5. Immediate post-operative clinical view after surgical extraction with sutures placed.

There were no associated complications following surgery. Medication was administered, post-extraction sutures were placed. Following surgery, the patient received postoperative verbal instruction on maintaining good oral hygiene and

the patient was followed for postoperative healing process. After a week, the sutures were taken out. The healing was uneventful.

Two crowns were seen upon gross inspection of the tooth specimen: the normal mandibular third molar had a well-formed crown with normal anatomic morphology, and the other tooth was a supernumerary tooth fused distally near the CEJ that had a less developed crown.

Review of the patient took place two weeks after surgery. Clinically, the intra-oral surgical site was healing well and showed no signs of infection, and the patient was pain-free. Additionally, there was no paraesthesia or numbness in the tongue, chin, or lower lip.

Discussion

Geminated and fused teeth are common abnormalities in teeth development, which can be difficult to differentiate. Tannenbaum and Alling¹⁶⁻¹⁷ defined fusion in 1963 as the union of two distinct tooth buds at a certain point in their development. According to the same authors¹⁶, gemination is the development of two teeth that are similar to each other from a single follicle and shows signs of an attempt to make the teeth fully separate.

Joined or fused teeth have been referred to by many different kinds of names. Certain types of anomalies in which one tooth is connected to another are suggested by the case reports for gemination, fusion, concrescence, twinning, and double teeth¹⁸⁻²¹.

A case can be categorized as "true fusion," which is defined as "union by enamel and dentin," or "late fusion," which is defined as "union by dentin and/or cementum," depending on the formative stage of development²². A cementum-only late fusion is referred to as "concrecence."²²

If the fusion starts before the calcification stage, which manifests clinically as a wide crown, then this is the "true fusion." "Late fusion" occurs after tooth calcification has progressed, and as a result, the tooth may have clinically different crowns because fusion may only occur in the root cementum²³.

Based on the shape and degree of fusion, Aguilo et al²⁴. Classified fused teeth as follows:

- Type I: Bifid crown, single root;
- Type II: Large crown, large root;
- Type III: Two fused crowns, double conical root;

Type IV: Two fused crowns, two glued roots.

Prevalence and location:

There is an estimated 0.5-2.5% overall prevalence of fused teeth in deciduous teeth, 0.1% in permanent dentition⁵³⁻⁵⁴, and 0.02% bilaterally in both dentitions⁵⁵. The incidence is the same for both men and women⁵⁶. Fusion is observed particularly prevalent in Japanese people and in deciduous teeth⁵⁷. According to reports, fusion teeth are uncommon among Caucasians, however studies from Nigeria showed that the prevalence of fusion teeth was 0.53%^{14, 58}. In a Jordanian population, Hamasha observed 0.43% of fusion teeth in the permanent dentition⁵⁶.

A fusion may occur in any area of the dental arch, but it is more prevalent in the premaxilla. Incisors are frequently affected by fusion, especially the maxillary central incisors (3.6%) while mandibular third molars have an incidence of (0.9%)^{59, 56}. Although they are uncommon, impacted fused molars are more prevalent in the maxilla than the mandible⁵⁹. Most frequently, two adjacent teeth fuse together. There are reports of fusion among three teeth together. Nagaveni et al⁶⁰. (2016) documented a case involving an Indian patient who had fusion in triple teeth in the primary dentition. A case of fusion in the primary maxillary central and lateral incisors was reported by Veerakumar et al⁶¹. (2011). surprisingly, they also observed on radiographs the fusion of the permanent same successors.

Etiology:

The aetiology of fusion remains unclear. The morphodifferentiation phase of tooth development is when fusion occurs. As of currently, it is believed that fusion results from direct contact between the teeth brought on by pressure or physical force during tooth formation⁶². According to Shafer²² et al., pressure from a physical force prolongs the contact between developing teeth, leading to fusion. According to Lowell and Solomon⁶³, the process of fused teeth occurs when young tooth germs come into touch with one another, causing necrosis of the intervening tissue and the enamel organ and dental papilla to fuse together.

However, a number of factors, including racial determinants, environmental factors, trauma, systemic disorders, vitamin deficiencies, and genetic predisposition, have been suggested

to be responsible for its development. Conditions like fetal alcohol exposure, thalidomide embryopathy, and pregnant lady with hypervitaminosis A or viral infection during pregnancy have also been implicated for the etiology of fusion teeth⁶⁴⁻⁶⁷. According to Mitsiadis et al⁶⁸. (2005), notch signaling mediated by the Jagged2 gene plays a crucial role in both tooth development and fusion of teeth. Fusion may also be associated with certain syndromes like chondroectodermal dysplasia, achondroplasia, focal dermal hypoplasia, Wolf Hirschhorn syndrome and Russel-Silver syndrome^{58, 69, 70}.

Hereditary involvement has also been proposed by a number of authors as an autosomal dominant trait with reduced penetrance. Hagman⁷¹ reported two members of a five-member family who were found to have multiple fused teeth in their primary dentition.

Clinical Consideration:

Many cases of fused teeth are asymptomatic, and they are often discovered only through a clinical or radiographic examination. Clinically, complete fused teeth are characterized by an unusually wide crown that is separated into mesial and distal portions by a developmental groove. Teeth that are not fully fused have separate crowns, pulp chambers, and root canals⁷².

Few clinical problems that require clinical intervention can result from this anomaly, including dental caries, irreversible pulpitis with secondary periapical involvement, pulpitis and apical periodontitis, paradental cyst, crowding, and periodontal disease⁷³. As a consequence of the irregular morphology, this anomaly also contributes to an unpleasant aesthetic tooth shape in the anterior region and when deep grooves are present, this may cause predisposition to caries and periodontitis, gingival inflammation and pocket formation because of the bacterial plaque accumulation⁷⁴. Fusion of teeth may cause spacing and alignment problems¹⁰.

A fused tooth can have a significant impact on its permanent successor teeth⁷⁵⁻⁷⁶. When this fusion occurs in the primary dentition, this can affect the succedaneous dentition such as delayed exfoliation of the primary fused teeth due to the increased root surface area and greater root mass.

Differential Diagnosis:

A common abnormality in tooth development is geminated and fused teeth, which can be difficult to differentiate and can be a diagnostic dilemma for the dentist. It can be challenging to distinguish between gemination and fusion, but radiographic examination and a count of the teeth in the region are usually utilized to confirm the diagnosis⁷⁷.

Gemination is clinically identified by a depression in the clinical crown. Usually, geminated teeth share the same root system and root canals, but have completely or partially separated crowns. Whereas, a fused tooth is formed by the fusion of two normal tooth germs, and its pulp chamber and root canal may exhibit a variety of connections or separations depending on its developmental stage. Dentin remains connected in fused teeth²⁴.

Fused teeth may exist between two normal teeth or between a normal tooth and a supernumerary tooth, making it difficult to distinguish it from a geminated tooth⁷⁸. The "two teeth" rule of Mader⁷⁸ is a practical way to distinguish dental fusion from gemination. The case most likely depicts fusion if the resultant dental structure—the two fused teeth—is counted as two teeth and if the number of teeth in the region is normal. However, if the extra tooth is present in the area and the atypical dental structure is counted as two teeth, the case could indicate gemination, or the fusion of a normal and a supernumerary tooth⁷⁹. This diagnostic approach cannot be used in cases where the fusion involves natural and supernumerary teeth, as in our case. The probability that a tooth was extracted in the area, either known or unknown to the patient, must also be considered⁷⁹.

Diagnosis:

Radiographic investigations are essential for the diagnosis of such complex diseases. Since conventional intraoral periapical views typically result in the superimposition of two-dimensional images of a three-dimensional object, they are among the radiological approaches that are not particularly helpful for diagnosis. The two-dimensional nature of this imaging method may limit the ability to determine the root anatomy of teeth with anatomical variations³⁹.

Cone beam computed tomography (CBCT) with its most efficient maxillofacial imaging, is the most comprehensive way of

assessing this anomaly and determining the precise difference between tooth germination and fusion⁸⁰. Three-dimensional reconstructions made easy by the CBCT allow for the determination of the axial, sagittal, and coronal planes^{81,82,83}. Additionally, the pattern and morphology of non-erupted or supernumerary teeth, as well as their relationship to neighboring teeth, are all precisely demonstrated, as is the anatomic relationship between the inferior alveolar canal and the third molar. CBCT is useful for facilitating surgical approaches to extractions and other treatment options, as well as for precisely identifying the site of an impacted molariform distomolar⁸.

Treatment:

Treatment options involve extracting the tooth, endodontic treatments, reducing the dimension of the mesiodistal tooth, orthodontic therapy, tooth hemisection, and/or intentional replantation^{84, 85}.

Most fusions require the surgical extraction of those involved due to their abnormal morphology and large mesiodistal width, which cause crowding, misaligned teeth, and occlusal dysfunction. In rare instances, some fused teeth have been documented to be saved in the literature. Endodontic treatment is typically challenging because of the complex anatomy, irregular tooth location, and difficulties with rubber dam isolation. Careful maintenance and frequent evaluation are necessary for asymptomatic cases. Bicuspidization can be considered as one of treatment alternative for fused teeth. Previously reported in literature one of the treatment options includes bicuspidization after endodontic treatment for the fused tooth^{86, 87}.

Although supernumerary teeth are considered unusual anomalies, they are not as rare as previously reported. Their presence, alongside other dental anomalies, holds clinical significance. Identifying these anomalies may serve as an indicator of potential complications, pathologies, other dental anomalies, syndromes, and familial associations. Gemination and fusion of teeth, although rare, are clinically important due to their potential side effects and implications for other teeth. Appropriate and careful diagnosis is essential to prevent postsurgical complications in such cases.

Fusion of distomolar with the third molar has been reviewed from the previously reported cases (Table 1). Fusion of distomolar with the

third molar has been seen more in male (n=18) as compared to females (n=10). Occurrence is equally distributed on both left (14) and right side (13), in our case it was located on the right side (Fig 1 and fig 2). Review of previous reported cases where fusion of distomolar to the third molar is commonly seen in mandible (23) as compared in maxilla (9), but according to Zhu H⁵⁹ fused molars are more prevalent in the maxilla than the mandible. This does not hold true in our literature search. Most of the patient presents with pain, swelling, pericoronitis, caries and food lodgment, as compared to the symptoms from previous cases, our patient presented to the oral surgery clinic with pain, discomfort and pericoronitis with partially impacted lower right third molar. Few cases have also been reported as an accidental findings^{26, 30, 39, 43, 44}. Abrams RA²⁵ reported a case of inverted supernumerary tooth fused with third molar along with a dentigerous cyst. Prakash AR³⁵ reported a case of fusion of partially impacted 3rd molar with a paradental cyst.

Prior to treatment planning, a radiographic evaluation of the tooth in question is required to determine the complexity of the germination or fusion. Although periapical and panoramic radiographs usually provide the necessary information, they are not as precise as three-dimensional ones. Utilizing the CBCT, three-dimensional reconstructions that provide information on the coronal, sagittal, and axial planes can be carried out. In addition, it makes evident the relationship between the mandibular canal and the third molar anatomically, as well as the pattern and morphology of non-erupted or supernumerary teeth and how they relate to the mandibular canal and neighboring teeth. In the case provided, an OPG radiograph was enough to evaluate the fusion diagnosis of distomolar

with third molar. CBCT was not utilized as we didn't want the patient to undergo further exposure.

Unfortunately, because of their unusual crown morphology, the majority of these fusions need to be surgically removed. The case presented here was surgically removed (Figure 3, 4, 5). If the crown morphology of fused teeth was large, surgical extraction with splitting of fused tooth can be undertaken as reported in few cases^{31,38,42}. Few case reports^{28,29,32,50} are published where cases of fusion between a mandibular third molar with a fourth molar, which was successfully treated with nonsurgical endodontic therapy. One possible treatment option for teeth fusion is bicuspidization following endodontic treatment for the joined tooth. This can only be possible if the fused teeth are fully erupted without caries, pericoronitis.

Conclusions

Fusion between a third molar and a supernumerary molar is an uncommon occurrence in permanent posterior teeth. In order to avoid confusing this case for another aberrant union it is important to ensure that a correct diagnostic and treatment plan is established. Dental abnormalities may first appear as variations in tooth size and shape during the initial radiography examination. Increasing dentists' knowledge will enable them to plan treatments carefully and ensure successful outcomes.

Declaration of Interest

The authors report no conflict of interest.

| Sn | Author (Year) | G | Location | Sid e | Signs/ Symptoms | Radiographic Assessment | Treatment |
|----|--------------------------------|---|-----------|-------|--|-----------------------------|---------------------|
| 1. | Abrams RA ²⁵ (1979) | M | Mandible | L | Inverted supernumerary tooth, dentigerous cyst | Periapical Radiography | Surgical extraction |
| 1. | Huang YL ²⁶ (1986) | M | Mandible | L | Routine Dental Examination | Periapical Radiography | Surgical extraction |
| 2. | HOU GL ²⁷ (1989) | F | Maxillary | R | Gingival bleeding | Periapical Radiography | Surgical extraction |
| 3. | Turell IL ²⁸ (1999) | M | Mandible | L | severe pain | Periapical Radiography | RCT |
| 4. | Turell IL ²⁹ (1999) | M | Mandible | R | severe pain | Periapical Radiography | RCT |
| 5. | JB Taheri ³⁰ (2005) | M | Mandible | L | Routine dental check up | OPG, periapical radiographs | Observation |

| | | | | | | | |
|-----|---|---|----------------------------|---|--|-----------------------------|---|
| 6. | C. López ³¹ Carriches (2008) | M | Mandible | R | Pain, trismus partially impacted 3 rd molar, Pericoronitis. | OPG | Surgical extraction with sectioning of tooth. |
| 7. | Ali Zeylabi ³² (2010) | M | Mandible | L | Pain radiating to the left ear. | Periapical | RCT |
| 8. | Isa Kara ³³ (2011) | — | 2 Cases: Mandible | L | — | — | — |
| 9. | Rong MD (2011) ³⁴ | | Maxillary | L | — | — | Surgical Extraction |
| 10. | Prakash AR ³⁵ (2012) | F | Mandible | L | Partially impacted 3 rd molar, Pain pericoronitis, paradental cyst | OPG, CBCT | Surgical Extraction |
| 11. | Taheri JB ³⁶ (2013) | F | Mandible | R | partially impacted third molar | OPG | Surgical extraction |
| 12. | Guerrero F ³⁷ (2014) | F | Mandible | L | Pain, Partially impacted 3 rd molar. | OPG, Periapical | Surgical Extraction |
| 13. | Ferreira-Júnior ³⁸ (2014) | F | Mandible | R | partially erupted 3 rd molar | Occlusal, OPG, CBCT | Surgical Extraction with splitting of fused tooth |
| 14. | Moreira DD ³⁹ (2014) | F | Maxillary | L | incidental finding, asymptomatic, | OPG, CBCT | routine review and maintenance |
| 15. | Kumar A ⁴⁰ (2015) | M | Mandible | R | Partially erupted 3 rd molar with pericoronitis. | OPG | Surgical extraction |
| 16. | Pauly G ⁴¹ (2017) | M | Mandible | L | pain, Impacted third molar | OPG | Surgical extraction |
| 17. | Mitate E ⁴² (2017) | M | Maxillary | R | Pain, Impacted third molar | Periapical, OPG, CBCT | Surgical extraction by splitting the teeth |
| 18. | Cai X ⁴³ (2020) | M | Maxillary | R | Routine Dental check up | CBCT | Observation and follow up |
| 19. | Resende ⁴⁴ (2020) | M | Maxillary | R | None | OPG, CBCT | Surgical Extraction |
| 20. | Shetty UA ⁴⁵ (2020) | M | Mandible | R | Pain, swelling partially erupted third molar pericoronitis. Badly decayed cavity | Periapical Radiography | Surgical extraction |
| 21. | Rai R ⁴⁶ (2021) | M | Maxilla | L | Radiating pain in (TMJ) on left side. | OPG, CBCT | Surgical extraction |
| 22. | Amarillas EED ⁴⁷ (2021) | M | Case 1: Mandible Case: 2,3 | R | pericoronitis, partially erupted 3 rd molar | OPG | Surgical extraction |
| 23. | Kowlessar A ⁴⁸ (2021) | M | Mandible | L | bleeding gums | OPG, CBCT | Surgical extraction |
| 24. | Rajaram MK ⁴⁹ (2022) | F | Maxillary | R | food lodgment, carious third molar | periapical radiograph, CBCT | Extraction |
| 25. | Almutairi W ⁵⁰ (2022) | M | Mandible | R | Pain, irreversible pulpitis, apical periodontitis. | periapical radiograph, CBCT | RCT |
| 26. | Godoy AB de ⁵¹ (2023) | F | Mandible | L | Impacted third molar | OPG, CBCT | Surgical Extraction. |
| 27. | Leow J ⁵² (2023) | F | Mandible | L | Pain, swelling & pus discharge | OPG, CBCT | Surgical extraction |
| 28. | Apeessos I (2024) ⁷³ | M | Maxilla | L | Pain, Periodontitis | OPG | Surgical extraction |
| 29. | Alshamrani (20024) ¹⁵ | F | Mandible | R | Pain | OPG, CBCT | Surgical extraction |

Table 1. The dental literature concerning the presentation of distomolar fusion with third molar is reviewed and analyzed.

References

- Al-Iryani GM, Ali FM. Twelve Impacted Supernumerary Teeth in a Nonsyndromic Patient: A Rare Case Report. *J Contemp Dent Pract* 2017; 18(4):342-344.
- FM Ali, AM Bajawi, IM Gadhan, MA Kariri. A case series of rare variations in impacted permanent molars. *Sch J Med Case Rep*, Nov 2016; 4(11):879-882.
- Ali FM, Thomas M, Otudi JMY, Mobarki Y, Essa AA. Case Report of Multiple Supernumerary Teeth in the Maxillary Anterior Region Causing Impaction of Permanent Maxillary Central Incisor. *Ann. Int. Med. Den. Res.* 2017; 3(4): DE13-DE15.
- Parolia A, Kundabala M. Bilateral maxillary paramolars and endodontic therapy: a rare case report. *J Dent (Tehran)*. 2010; 7(2):107-11.
- Ali FM, Aridhi WH, Hommadi AM, Altharawi RA, Khan MA. A Rare Case Series: Impacted Distomolars. *Open Access Maced J Med Sci.* 2019 Dec 15; 7(23):4078-4081.
- Rasheed M. JF, Somili AM, Rubaydi GA, Masmali LMH, Ali FM. Three Distomolar in Single Patient: A Unique Case Report. *J. Pharm. Res. Int.* 2021; 33(58A):585-8.
- Faqeeh MA, Al Absi FS, Alrefai MA, Fareedi MA. A case report of bilateral impacted mandibular fourth molars. *International Journal of Contemporary Medical Research* 2017; 4(11):2306-2307.
- Mohan KR, Thangavelu RP, Fenn SM. Impacted Molariform Distomolar Double Tooth: A Case Report. *Cureus.* 2022; 14(4):e23780. DOI 10.7759/cureus.23780
- Mahendra L, Govindarajan S, Jayanandan M, Shamsudeen SM, Kumar N, Madasamy R. Complete bilateral gemination of maxillary incisors with separate root canals. *Case Rep Dent.* 2014; 2014:425343. doi: 10.1155/2014/425343.
- Sachdeva GS, Malhotra D, Sachdeva LT, Sharma N, Negi A. Endodontic management of mandibular central incisor fused to a supernumerary tooth associated with a talon cusp: a case report. *Int Endod J.* 2012; 45(6):590-6. doi: 10.1111/j.1365-2591.2012.02029.x.
- Rani K, Metgud S, Yakub SS, Pai U, Toshniwal NG, Bawaskar N. Endodontic and esthetic management of maxillary lateral incisor fused to a supernumerary tooth associated with a talon cusp by using spiral computed tomography as a diagnostic aid: a case report. *J Endod.* 2010; 36(2):345-9. doi: 10.1016/j.joen.2009.07.014.
- Brook GB, Winter GB. Double teeth: a retrospective study of geminated and fused teeth in children. *Br Dent J* 1970; 129(3):123-30. doi: 10.1038/sj.bdj.4802533.
- Neville BW, Damm DD, Allen CM, Bouquet JE. Abnormalities of

- teeth. In: Neville BW, Damm DD, Allen CM, Bouquet JE, editors. Oral and maxillofacial pathology. 2nd ed. Oxford: WB Saunders; 2002. p. 69-77.
14. Duncan WK, Helpin ML. Bilateral fusion and gemination: a literature analysis and case report. *Oral Surg Oral Med Oral Pathol.* 1987; 64(1):82-7. Doi: 10.1016/0030-4220(87)90121-6.
 15. Alshamrani MS, Alghamdi HA, Haya Almasari HR. Mandibular Third Molar Fusion with a Supernumerary Tooth: A Case Report in Saudi Arabia. *J Oral Med and Dent Res.* 2024; 6(1): 82.
 16. Tannenbaum KA, Ailing EE. Anomalies tooth development: case reports of gemination and twinning. *Oral Surg Oral Med Oral Path.* 1963; 16:883-887.
 17. Bhaskar. Synopsis of oral pathology 1st Indian Edition, 1990; CBS publishing and distribution.
 18. Aguiló L, Gandia JL, Cibrian R, Catala M. Primary double teeth. A retrospective clinical study Of their morphological characteristics and associated anomalies. *Int J Paediatr Dent.* 1999; 9(3):175-83. doi:10.1046/j.1365-263x.1999.00131.x
 19. Brook AH, Winter GB. Double teeth. A retrospective study of 'geminated' and 'fused' teeth in Children. *Br Dent J.* 1970; 129(3):123-30. doi:10.1038/sj.bdj.4802533.
 20. Gellin ME. The distribution of anomalies of primary anterior teeth and their effect on the permanent successors. *Dent Clin North Am.* 1984; 28(1):69-80.
 21. Nik-Hussein NN, Abdul Majid Z. Dental anomalies in the primary dentition: distribution and Correlation with the permanent dentition. *J Clin Pediatr Dent.* 1996; 21(1):15-9.
 22. Shafer WG, Hine MK, Levy BM. Shafer's textbook of oral pathology. 1983, 4th ed, West Washington Square, WB Saunders Company, Philadelphia.
 23. Meisha DE. Coincidence of Fusion and Concrecence in Mandibular Deciduous Incisors: A Case Report. *J Contemp Dent Pract.* 2019; 20(12):1466-1469.
 24. Aguiló L, Gandia J, Cibrian R, Catala M. Primary double teeth. A retrospective clinical study of their morphological characteristics and associated anomalies. *Int. J. Paediatr. Dent.* 1999; 9(3): 175-183. doi:10.1046/j.1365-263x.1999.00131.x
 25. Abrams RA, Nelson DL. Fusion of a third molar to a supernumerary tooth with an associated dentigerous cyst. *Australian Dental Journal.* 1979; 24(3): 141-142. doi:10.1111/j.1834-7819.1979.tb02411.x
 26. Huang YL, Shen YS, Yan YH, Chao TC, Lin CC, Lin LM. Impacted "reversed" fused tooth: a case report. *Gaoxiang Yi Xue Ke Xue Za Zhi.* 1986; 2(7):460-464.
 27. Hou GL, Tsai CC. Fusion of maxillary third and supernumerary fourth molars. Case report. *Aust Dent J.* 1989; 34(3): 219-222. doi:10.1111/j.1834-7819.1989.tb00672.x.
 28. Turell IL, Zmener O. Endodontic therapy in a fused mandibular molar. *Journal of Endodontics.* 1999; 25(3): 208-209. Doi: 10.1016/s0099-2399(99)80144-7.
 29. Turell IL, Zmener O. Endodontic management of a mandibular third molar fused with a fourth molar. *International Endodontic Journal.* 1999; 32(3):229-231. doi:10.1046/j.1365-2591.1999.00192.x .
 30. Taheri JB, Baharvand M, Vahidi-Ghahrodi AR. Unilateral Fusion of a Mandibular Third Molar to a Supernumerary Tooth: A Case Report. *Journal of Dentistry, Tehran University of Medical Sciences.* 2005; 2(1): 33-35.
 31. López-Carriches C, Leco-Berrocá I, Baca-Pérez-Bryan R. Fusion of mandibular third molar with supernumerary fourth molar. *Rev Esp Cirug Oral Y Maxillofac.* 2008; 30:344-7.
 32. Zeylabi A, Shirani F, Heidari F, Farhad AR. Endodontic management of a fused mandibular third molar and distomolar: a case report. *Aust Endod J.* 2010; 36(1):29-31. doi: 10.1111/j.1747-4477.2009.00190.x.
 33. Kara Mİ, Aktan AM, Ay S, Bereket C, Şener İ, Bülbül M, et al. Characteristics of 351 supernumerary molar teeth in Turkish population. *Med Oral Patol Oral Cir Bucal.* 2012; 17(3):e395-400. doi: 10.4317/medoral.17605.
 34. Rong MD, Wu ML, Huang Y, Lü YT, Lu XL. The fused tooth of maxillary third molar with supernumerary tooth: a case report. *Hua Xi Kou Qiang Yi Xue Za Zhi.* 2011; 29(1):100-1.
 35. Prakash AR, Reddy PS, Rajanikanth M. Paradental cyst associated with supernumerary tooth fused with third molar: A rare case report. *J Oral and Maxillofac Pathol.* 2012; 16(1):131-133. DOI: 10.4103/0973-029X. .92991.
 36. Taheri JB, Babae S, Bagheri F, Azimi S. Fusion of Mandibular Third Molar with Distomolar Impacted Tooth: A Case Report. *J Mash Dent Sch.* 2013; 37(3): 267-70.
 37. Guerrero F. Mandibular third molar retained and fused with a supernumerary fourth molar: a case report. *Int J Dent Health Sci.* 2014; (3): 443-448.
 38. Ferreira-Junior O, de Avila LD, Sampieri MB, Dias-Ribeiro E, Chen WL, Fan S. Lower third molar fused with a supernumerary tooth: diagnosis and treatment planning using conebeam computed tomography. *Rev Gaucha Odontol* 2014; 62(4):453-457.
 39. Moreira DD, de-Azevedo-Vaz SL, Melo SLS, de Freitas DQ. Unusual fusion of a distomolar with a third molar assessed by cone-beam computed tomography. *Stomatos.* 2014; 20(38):12-17.
 40. Kumar A, Srivastava RK, Ali I, Wadhvani P, Singh H. Fused mandibular third molar with supernumerary tooth: A rare case report. *Indian J Oral Sci* 2015; 6:26-9.
 41. Pauly G, Kashyap RR, Kini R, Rao PK, Bhandarkar GP, Shetty U. The Tip of the Ice-Berg: A Case of an Impacted Third Molar Fusion. *ARC Journal of Radiology and Medical Imaging.* 2017; 2(2): 12-13.
 42. Mitate E, Kawano S, Mikami Y, Kiyoshima T, Ikebe T, Nakamura S. A case of inversely fused tooth of impacted maxillary third molar and supernumerary tooth. *Int J Case Rep Images* 2017; 8(2):129-132.
 43. Cai X, Cui L, Chen K. Impacted Right Maxillary Third Molar Fused With Supernumerary Tooth. *Journal of the College of Physicians and Surgeons Pakistan* 2020; 30(05): 552.
 44. Resende MAP, Francisquini IDE, Assis NMSP, Sotto-Maio BS. Supernumerary tooth fused to a maxillary impacted third molar: case report. *HU Rev.* 2020; 46:1-6. DOI: 10.34019/1982-8047.2020.v46.28918.
 45. Shetty UA , Hegde P , Shetty P , Vidya M, Sreelatha S.V. , D'Cruz AM , Shenoy M. Mandibular third molar fused with a Supernumerary tooth: Report of a Rare Case. *Nitte. University Journal of Health Science.* 2012; 2(4):71-73.
 46. Rai R, Kaura S, Bhardwaj S, Satia G, Budhiraja N. Fusion of multiple impacted supernumerary teeth with maxillary third molar - A rare case report. *Indian J Dent Sci* 2021; 13:125-7.
 47. Amarillas EED. Fusión del tercer molar inferior con un cuarto molar. Reporte de tres casos. *Rev ADM.* 2021; 78 (2): 95-99. <https://dx.doi.org/10.35366/99285>.
 48. Kowlessar A, Henry K, Bissoon A, Hoyte T. Fusion of a Mandibular Third Molar and a Distomolar in a Trinidadian Child: Report of a Rare Case Diagnosed Using CBCT. *Open Journal of Stomatology.* 2021; 11(8): 271-277. doi: 10.4236/ojst.2021.118024.
 49. Rajaram MK, Pethagounder TR, Fenn SM. Impacted Molariform Distomolar Double Tooth: A Case Report. *Cureus.* 2022; 14(4):e23780. doi: 10.7759/cureus.23780.
 50. Almutairi W, Alduraibi M. Endodontic Management of a Fused Mandibular Third Molar with Supernumerary Tooth Using Cone-Beam Computed Tomography: A Case Report. *Am J Case Rep.* 2022; 23:e937224. doi: 10.12659/AJCR.937224.
 51. Godoy AB de, Maia IM de S, Godoy EP de, Cruz RKS. "Included Third Molar Fused With Supernumerary: Case Report". *Research, Society and Development.* 2021; 10(9): e52310918303. doi:10.33448/rsd-v10i9.18303.
 52. Leow J, Solanki K, Kumar M. Fusion of an Impacted Third and Supernumerary Fourth Molar Tooth with Concrecence of the Second Molar. *Dental Update* 2024; 50(9): 707-709.
 53. Pindborg JJ. Pathology of the dental hard tissues 1970 Philadelphia W. B. Saunders Co.:47-55.
 54. Sunny J, Kedilaya V, Pai R, Rai D, Rao M. Fusion of teeth – A rare developmental anomaly Brunei Int Med J. 2013;9:52-5.

55. Taheri JB, Baharvand M, Ghahrodi AR. Unilateral fusion of a mandibular third molar to a supernumerary tooth: A Case Report. *Journal of Dentistry*, Tehran University of Medical Science 2005;2:33-5.
56. Hamasha AA, Al-Khateeb T. Prevalence of Fused and Geminated Teeth in Jordanian Adults. *Quintessence Int.* 2004; 35(7): 556-559.
57. Tomizawa M, Shimizu A, Hayashi S, Noda T. Bilateral maxillary fused primary incisors accompanied by succedaneous supernumerary teeth: report of a case. *Int J Paediatr Dent* 2002; 12(3):223-7.
58. Ahmeceran S, Yildiray S, Yasin Y, Hali S, Abdullah E. Prevalence of fusion and germination in permanent teeth in Coppadocia region in Turkey. *Pakistan Oral & Dental Journal.* 2011; 31(1): 17-22.
59. Zhu M, Liu C, Ren S, Lin Z, Miao L, Sun W. Fusion of a supernumerary tooth to right mandibular second molar: a case report and literature review. *Int J Clin Exp Med.* 2015; 8(8):11890-11895.
60. Nagaveni NB, Yadav S, Poornima P, Sanalkumar D. Triple and double teeth in the same quadrant: Report of a rare case with literature review. *J Dent Oro Surg.* 2016;1(4):117. doi: 10.19104/JDOS.2016.117
61. Veerakumar R, Pari MA, Prabhu MN. Caution - we are erupting as twins. *J Clin Diagn Res.* 2011; 5(5): 1123-4.
62. Açikel H, İbiş S, Şen Tunç E. Primary Fused Teeth and Findings in Permanent Dentition. *Med. Princ. Pract.* 2018; 27(2):129-132. doi:10.1159/000487322.
63. Lowell RJ, Solomon AL. Fused Teeth. *The Journal of the American Dental Association.* 1964; 68:762-763.
64. Tomizawa M, Shimizu A, Hayashi S, Noda T. (2002) Bilateral Maxillary Fused Primary Incisors Accompanied by Succedaneous Supernumerary Teeth: Report of a Case. *Int J Paediatr Dent.* 2002; 12(3): 223-227. <https://doi.org/10.1046/j.1365-263X.2002.00351.x>.
65. Suri L, Gagari E, Vastardis H. Delayed tooth eruption: Pathogenesis, Diagnosis, and treatment. A literature review. *American Journal of Orthodontics and Dentofacial Orthopadics.* 2004; 126(4):432-445.
66. Schuurs AH, van Loveren C. Double teeth: review of the literature. *ASDC J dent Child.* 2000; 67(5): 313-325.
67. Bailleul-Forestier I, Berald A, Vinckier F, de Ravel T, Fryns JP, Verloes A. The genetic basis of inherited anomalies of teeth. Part 2: Syndromes with significant dental involvement. *Eur J Med Genet.* 2008; 51(5): 383-408. doi:10.1016/j.ejmg.2008.05.003.
68. Mitsiadis TA, Regaudiat L, Gridley T. Role of the Notch signalling pathway in tooth morphogenesis. *Arch Oral Biol.* 2005; 50(2):137-40. doi: 10.1016/j.archoralbio.2004.10.006.
69. Babaji P, Prashanth MA, Gowda AR, Ajith S, D'Souza H, Ashok KP. Triple teeth: Report of an unusual case. *Case Rep Dent.* 2012;2012: 735925. doi: 10.1155/2012/735925.
70. Sharma D, Bansal H, Sandhu SV, Bhullar RK, Bhandari R, Kakkar T. Fusion: A case report and review of literature. *Journal of Craniomaxillary Disease* 2012;1:114-8.
71. Hagman FT. Fused primary teeth: A documented familial report of case. *ASDC J. Dent. Child.* 1985; 52(6): 459-460.
72. Camargo AJ, Arita ES, Watanabe PC. Fusion or gemination? An unusual mandibular second molar. *Int J Surg Case Rep.* 2016; 21:73-77. doi:10.1016/j.ijscr.2015.12.010
73. Apessos I, Memis I, Mikrogeorgis G, Delantoni A, Dionysopoulos D, Lillis T. Fusion of a maxillary third molar with a supernumerary fourth molar: A case report. *Clin Case Rep.* 2024; 12(2):e8484. doi:10.1002/ccr3.8484.
74. Turkaslan S, Gokce HS, Dalkiz M. Esthetic rehabilitation of bilateral geminated teeth; a case report. *Eur J Dent.* 2007; 1(3): 188-191.
75. Yuen SW, Chan JC, Wei SH. Double primary teeth and their relationship with the permanent Successors: a radiographic study of 376 cases. *Pediatric dentistry.* 1987; 9(1):42-8.
76. Wu CW, Lin YT, Lin YT. Double primary teeth in children under 17 years old and their correlation with permanent successors. *Chang Gung Med J.* 2010; 33(2):188-193.
77. Altug-Atac AT, Erdem D. Prevalence and distribution of dental anomalies in orthodontic patients. *Am J of Orthod Dentofacial Orthop.* 2007; 131(4):510-4.
78. Ben Salem M, Chouchene F, Masmoudi F, Baaziz A, Maatouk F, Ghedira H. Fusion or Gemination? Diagnosis and Management in Primary Teeth: A Report of Two Cases. *Case Rep Dent.* 2021; 2021:6661776.
79. Mader CL. Fusion of teeth. *J Am Dent Assoc.* 1979; 98(1):62-4. doi: 10.14219/jada.archive.1979.0037.
80. Ramezani M, Asgari S, Adel M. Endodontic management of a rare case of the geminated maxillary second molar tooth using CBCT. *Clin Case Rep.* 2021; 9(8):e04496.
81. Dodson TB. Role of computerized tomography in management of impacted mandibular third molars. *N Y State Dent J.* 2005; 71(6): 32-35.
82. Noorani TY, Shahid F, Ghani NRNR, Saad NR, Nowrin SA. Effective Use of Cone Beam Computed Tomography to Detect a Lateral Root Perforation: A Case Report. *Journal of International Dental and Medical Research.* 2018; 11(2): 520-525.
83. Cheah HL, Ong YYO, Choo EQW, Gan PLG, Acharya S. How Ready are Our Students for Cone Beam Computed Tomography?. *Journal of International Dental and Medical Research.* 2020; 14(1):292-297.
84. Guler DD, Tunc ES, Arici N, Ozkan N. Multidisciplinary management of a fused tooth: a case report. *Case Rep Dent.* 2013; 2013:634052. doi: 10.1155/2013/634052.
85. Brunet-Llobet L, Miranda-Rius J, Lahor-Soler E, Cahuana A. A fused maxillary central incisor and its multidisciplinary treatment: an 18-year follow-up. *Case Rep Dent.* 2014; 2014:503478. doi:10.1155/2014/503478.
86. Hulsmann M, Bahr R, Grohmann U. Hemisection and vital treatment of a fused tooth-literature review and case report. *Endod Dent Traumatol* 1997; 13(6): 253-258. doi: 10.1111/j.1600-9657.1997.tb00051.x.
87. Cetinbas T, Halil S, Akcam MO, Sari S, Cetiner S. Hemisection of a fused tooth. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007; 104(4): e120-124. doi:10.1016/j.tripleo.2007.03.029.