CASE REPORT

Management of non-syndromic double tooth affecting permanent maxillary central incisors: a systematic review

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SUMMARY

To assess management of non-syndromic double tooth affecting permanent maxillary central incisors, we performed a systematic review and also present 2 case reports. We searched MEDLINE via PubMed and the reference lists of included reports. Eligible studies were any type of clinical studies describing the management of non-syndromic double tooth affecting the crown of a permanent maxillary central incisor. We included 68 studies corresponding to 72 relevant case reports. Therapeutic options in descending order of priority were restorative dentistry (35%), hemisection (33%), abstinence (17%) or extraction (15%). Orthodontic management resulted in 57% of cases. We report an 11-year-old boy with bilateral fusion of the two maxillary central incisors and a 9-year-old boy with a double left central incisor and a supernumerary lateral right incisor. A multidisciplinary approach is key to management of permanent maxillary central incisors affected by coronary anomalies.

CASE PRESENTATION

Case 1

An 11-year-old boy presented to the dental department with symptom of large front teeth. Clinical examination revealed large maxillary left (21–21 bis) and right central incisors (11–11 bis). These two double central maxillary incisors may have resulted from fusion of a central incisor with a supernumerary incisor ([figure 1A, B](#)). Intraoral periapical radiographs could not confirm whether the pulp chambers were separate or not ([figure 2A, B](#)). Orthopantomography (OPG) also showed fusion of maxillary incisors on both sides and presence of both maxillary lateral incisors. Root axes of 21–21 bis were widely divergent. Cone beam CT (CBCT) revealed a coronary common dentin-pulp complex in the right maxillary incisors ([figure 3](#)).

We chose hemisection for treatment. Before starting treatment, the patient and his parents were informed about the complex anatomy of the teeth, the therapeutic options and the potential complications.

Intentional pulpotomy of 11–11 bis was performed before tooth sectioning to prevent subsequent exposure of the vascular canals and tissue necrosis. This pulpotomy involved use of Biodentine (Septodont, France) ([figure 4](#)). Then a part of each tooth was separated under continuous irrigation. The distal part of 11–11 bis and the mesial part of 21–21 bis were chosen for

Figure 1 Case 1: Preoperative dentition (A) frontal view and (B) maxillary occlusal view.

orthodontic consideration. The supernumerary elements were then luxated and removed. The muco-periosteal flaps were repositioned and secured in place by using 4-0 non-absorbable black braided silk surgical sutures (Ethicon, Johnson and Johnson) ([figure 5A, B](#)).

Six months later, orthodontic appliances were applied ([figure 6](#)).

Case 2

A 9-year-old boy, in mixed dentition, presented with concerns of possible malalignment of his maxillary anterior teeth. Intraoral examination revealed

Figure 2 (A and B) Case 1: Preoperative intraoral periapical radiographs of the double tooth showing two separate roots.

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Figure 3 Case 1: Sectional radiographs (CT images): cross-sectional view at crown portion.

that the maxillary left central incisor (21) was double. The maxillary left lateral incisor (22) and mesial part of the double tooth were in crossbite (figure 7). Intraoral radiography revealed a large pulp complex of 21 with a single root (figure 8). OPG also showed a right supernumerary lateral incisor (12 bis) (figure 9). Three-dimensional (3D) CBCT was used to help determine the best treatment (figure 10). The pulp of the incisor was very broad and did not allow for an aesthetic proximal reduction without endodontic treatment.

Extraction of the double tooth (21) and transplantation of the supernumerary incisor (12 bis) in-site were planned after orthodontic treatment for crowding of 22. The treatment procedure was explained to the patient and his parents. The surgical procedure was performed with the patient under local anaesthesia. Mucoperiosteal flaps were raised buccally and palatally (figure 11A–C). After treatment, control periapical radiography was performed, and the patient was asked to visit the clinic 3 months (figure 12A) and 1 year later for follow-up (figures 12B and 13). Despite unfavourable hygiene, the evolution was favourable even if the root of the transplanted 12 bis was shorter than 22. Orthodontic treatment was not initiated because the patient moved to another city.

GLOBAL HEALTH PROBLEM LIST

Fusion is usually defined as the union of two normally separated tooth germs and gemination as the division of one normal tooth

Figure 4 Pulpotomy of 11-11 bis with Biodentine.

germ. Consequently, fusion may be differentiated from gemination by the reduced number of teeth, except in case of the union of a normal tooth and a supernumerary tooth,^{1 2} which is termed diphodontic gemination by several authors.^{3 4} The difference between fusion and gemination is difficult to determine. The terms ‘double’, ‘joined’, ‘twinned’ or ‘concrecence’ are commonly used to describe a tooth affected by fusion or gemination. Some authors also use ‘fusion/gemination’.⁵ Clinically, fusion or gemination are coronal anomalies in shape, size and structure of teeth. The prevalence varies from 0.1% to 0.2% in permanent teeth.^{6 7} The permanent maxillary central incisor is the most affected tooth (49%).⁸ For our review, we decided to use the term ‘double tooth’. This anomaly can induce carious lesions or pulpal necrosis, occlusal interference or periodontal disease and can create poor aesthetics.

We systematically reviewed the literature on management of permanent maxillary central incisors affected by ‘double tooth’ to analyse the therapeutic options. The term double tooth is used to refer to fusion or gemination. We also describe two cases with treatment of such coronal anomalies.

MATERIAL AND METHODS

A systematic review of the literature was performed.

Criteria for considering studies for this review

Eligible studies were published randomised controlled trials, comparative non-randomised studies, cohort studies, case series

Figure 5 (A) Case 1: Frontal view of the conserved permanent incisors after separation and extraction of the fused supernumerary teeth. (B) Case 1: Occlusal view of the conserved permanent incisors after separation and extraction of the fused supernumerary teeth.

Figure 6 Case 1: Frontal view with an orthodontic appliance.

or case reports describing the management of non-syndromic double tooth affecting the crown of a permanent maxillary central incisor.

Search methods for identification of studies

To identify studies, we searched the database MEDLINE via PubMed for articles published in English and French, with no restriction on date of publication. The search equation combined free text words and controlled vocabulary pertaining to the condition and interventions (see online supplementary file 1). The last search for articles was in April 2015. We checked the references of all eligible articles for relevant studies and scanned reference lists from identified review articles for further studies. We searched ClinicalTrials.gov for the protocols of included studies and to identify ongoing trials.⁹

Data collection

Two authors independently and in tandem screened the title and abstract of records retrieved by the search, as well as the selected full-text reports. Any disagreements were resolved by discussion. Finally, we included studies after eliminating duplicate publications.

For each randomised controlled trial, two authors independently and in tandem recorded the year of publication, inclusion/exclusion criteria specified, number of arms in the trial, treatments compared, detailed description of interventions, number of patients enrolled, number of treated teeth, mean age of participants, duration of follow-up and outcome data. We assessed the risk of bias for each trial by the Cochrane Collaboration Risk of Bias tool, which includes the following items: selection of participants, blinding of participants and personnel, blinding of outcome assessors, incomplete outcome data and selective outcome reporting.¹⁰ For non-randomised studies, we considered the risk of selection bias as high and also assessed the risk of bias related to confounding factors. For each randomised or non-randomised trial, each domain was rated as having a low, high or unclear risk of bias. Each study was then assigned an

Figure 8 Case 2: Intraoral periapical radiograph showing the large common dentin-pulp complex of 21.

overall risk of bias score: low risk (low for all key domains), high risk (high for 1 key or more domains) or unclear risk (unclear for 1 key or more domains). The two review authors compared evaluations and resolved any disagreements by discussion. For each cohort study, case series or case report, two authors independently and in tandem recorded the year of publication, gender and age of patients, teeth involved, pulpal anatomy for the double tooth (number of pulpal chambers and

Figure 7 Case 2: Preoperative dentition: frontal view.

Figure 9 Case 2: Orthopantomography showing the supernumerary tooth (12 bis) (green arrow: double tooth; red arrow: supernumerary tooth).

Figure 10 Case 2: Cone beam CT showing geminated central incisors and supernumerary tooth in panorama, cross-sectional, axial and three-dimensional views (green arrow: double tooth; red arrow: supernumerary tooth).

number of roots), presence or absence of aesthetic, periodontal, occlusal or caries problems, presence or absence of associated anomaly, detailed description of treatment, and requirement of endodontic treatment and orthodontic management.

Analysis

We did not perform any meta-analysis, but we described the study characteristics and results qualitatively with number, percentage or mean (minimum–maximum).

RESULTS

Literature search

The search yielded 640 potentially eligible articles. We included 68 relevant articles corresponding to 72 case reports in the review.^{1 3 5 11–75} The flow chart of article selection is in figure 14. We found no published randomised or non-

Figure 12 Case 2: Radiographic view (A) 3 months later and (B) 1 year later.

randomised trial, no published cohort study and no protocol of ongoing trials at ClinicalTrials.gov.

The median year of publication was 2004 (range 1971–2014); 18 articles were published before 1990, 12 between 1990 and 2000, 18 between 2000 and 2010, and 19 between 2010 and 2014. Over the last decade, the number of publications clearly increased.

Reported cases

Males were affected by double tooth in 56 cases (77%). Across the 68 case reports, the mean age of the patients was 14 years. The age range varied across studies from 7 to 60 years. For 12 of the 72 cases, the double tooth was associated with dens evaginatus.^{17 25 26 29 46 51 58 67 69} Double tooth was bilateral in 29 cases (40%), so we describe 101 permanent maxillary central incisors. A maxillary anterior supernumerary tooth was detected (ie, increased dental formula) in 9 cases (14%). A central incisor was fused with the other central incisor or with a lateral incisor (ie, decreased dental formula) in 13 cases (13%). Occlusal interferences were observed in 81% of cases. Details and references of corresponding case reports are given in table 1.

Regarding pulpal anatomy, 29 incisors had two pulp chambers and two independent roots (29%), 30 incisors had a single pulp chamber and a single root with a single pulp canal (29%), 16 incisors had a single pulp chamber and a single root with two pulp canals (16%), 10 incisors had a single pulp chamber

Figure 11 Case 2: Surgical procedures: (A) extraction 21; (B) extraction 12 bis and (C) transplantation of 12 bis in site of 21.

Figure 13 Case 2: Clinical view 1 year later.

Figure 14 Systematic review flow chart of case reports describing the management of non-syndromic double tooth affecting the crown of a permanent maxillary central incisor.

and two independent roots (10%), and 5 incisors had two pulp chambers and a single root with two pulp canals (5%). Details and references of corresponding case reports are given in online supplementary file 2.

Therapeutic options for treating double tooth are given in figure 15. Details and references of corresponding case reports are given in online supplementary file 3. We classified therapeutic options into four categories: the two treatments that were practised most were restorative dentistry (35%) and hemisection (33%), and the two other options were no treatment (17%) and extraction (15%).

First, restorative dentistry was performed for 36 incisors. The restorative dentistry involving subtraction by selective grinding reduces the width of the tooth to eliminate the amorphous shape and achieve normal morphological features. The rehabilitation of the double incisor involved composite (29 incisors) or ceramic crowns (7 incisors). Second, hemisection was performed for 33 incisors. Hemisection is defined as complete surgical division of the entire double tooth including the crown and roots to result in two separate teeth. It was recommended only if the double tooth possessed two separate roots. In 25 of the 34 incisors hemisected, one of the two separated teeth was removed and the crown of the remaining tooth was restored. For the eight other incisors, none of the two separated teeth were removed and the two crowns were restored.

Third, for 17 patients who were not concerned with aesthetic problems, the double tooth was not treated. Among these patients, two received orthodontic treatment without any other treatment.

Fourth, extraction of the tooth was performed for 15 incisors. For 7 (46.7%), the tooth was removed and replaced with an interim, removable partial denture until replacement with a fixed bridge or implant. After extraction, seven other patients underwent orthodontic closure of the space without other

prosthetic treatment; in three of these patients, before extraction, the dental formula was increased because of a supernumerary tooth located in the anterior maxillary region that was visible intraorally. For the four remaining patients, lateral incisors or canines were rehabilitated with composite for aesthetic purposes. One patient received autotransplantation of an intraosseous supernumerary tooth.

In total, 30 incisors (30%) needed endodontic treatment. For 14, the carious lesion was deep and required endodontic treatment. For nine, hemisection was performed and endodontic treatment of the remaining part of the double tooth was needed because the pulp systems of both teeth were connected in a common pulp chamber. Seven incisors were treated endodontically because crown restoration required extensive coronary preparation.

For 41 patients (57%), orthodontic management resulted in aesthetics and occlusion. Orthodontic treatment followed a surgical procedure for 37 patients; for 2, the orthodontic treatment was initiated before the surgical procedure. Orthodontic treatment was performed before restoration for three patients and before total hemisection followed by restoration for one patient.

In addition, 40 case reports reported the monitoring of the patient. The duration of follow-up was 12 months in median (mean 21 months, minimum–maximum 1–120 months).

DISCUSSION

To the best of our knowledge, no study has systematically reviewed the existing literature on the management of non-syndromic double tooth affecting the permanent maxillary central incisor. On the basis of limited evidence (only case reports), our results showed that dentists now have a broad range of management options for similar coronary anomalies involving a central incisor depending on the patient's pulpal and radicular anatomy in particular.

The aetiology of double tooth is unknown and could be multifactorial, with genetic and environmental causes.⁷⁶ These anomalies can induce carious lesions or pulpal necrosis, occlusal interference or periodontal disease and can create poor aesthetics.

Periapical radiography is commonly used for diagnosis and provides important information about the root anatomy. Nevertheless, periapical radiographs represent two-dimensional (2D) dental imaging and cannot be accurate and conclusive.^{25 77} CBCT is an interesting alternative because it provides 3D dental imaging.^{78 79} With double tooth, CBCT can reveal the level of the union of the double tooth and the number of roots, the anatomy of the pulp chamber (single vs 2 separate chambers) and the anatomy of the radicular pulp (single vs 2 or more pulp canals). The number of roots and anatomy of the pulp chamber and radicular pulp can be diagnosed only radiographically. Since 2D periapical radiographs cannot be totally conclusive for the diagnosis, CBCT should be systematically performed in all cases because it provides 3D dental imaging to help determine the best treatment.^{78 79} However, we found only four case reports (6%), published in 2003, 2010, 2012 and 2014, in which the authors performed CBCT.^{13 47 67 71} About 45% of included articles were published before 2000, which could explain in part the low use of CBCT. Besides pulpal and radicular anatomy, the degree of patient cooperation could explain the choice of therapy.⁸⁰ For both described clinical cases, the use of CBCT allowed an accurate support. Regardless of aetiology, a double tooth is among the most challenging problems in dentistry. Owing to the abnormal shape and size of the crown(s) and root(s) as well as misalignment, treatment usually requires a

Table 1 Characteristics of each case report

Study (first author) (reference)	Year	Gender	Age (years)	Teeth involved	Carious lesion	Occlusal interference	Increased dental formula	Decreased dental formula	Associated anomaly
Ammari ¹¹	2008	M	9	11	No	Yes	Yes (22 bis)		
Atasu ¹²	1996	M	NA	11, 21	No	Yes			
Benetti ¹³	2003	M	11	11, 21	No	Yes			
Chaudhry ¹⁴	1997	F	17	11, 21	Yes (11, necrosis)	Yes			
Chipashvili ¹	2011	M	20	11, 21	Yes (11, 21)	Yes			
Crawford ¹⁵	2006	M	8	11, 21	No	Yes			
Crawford ¹⁵	2006	M	11	21	No	Yes			
Delany ¹⁶	1981	M	9.5	11, 21	No	Yes			
Denyar ¹⁸	1983	M	8	11, 21	No	Yes			
Denyar ¹⁷	1982	F	9	11, 21	No	Yes			DE 11 lingual type 1
Finkelstein ¹⁹	2014	F	9.5	11	No	Yes	Yes (21 bis)		
Garattini ²⁰	1999	M	15	11, 21	Yes (11, 21)	Yes			
Gautam ²¹	2011	M	16	21	No	Yes	Yes		
Giancotti ²²	2011	M	13	21	No	Yes			
Good ²³	1980	M	9	11	No	Yes			
Gregg ²⁴	1985	M	11	11	No	NA			
Gündüz ²⁵	2006	M	11	11	No	Yes			DE lingual type 2
Harris ²⁶	1971	F	9	11	Yes	Yes			DE lingual type 1
Hashim ²⁷	2004	M	10	11, 21	No	Yes			
Hasiakos ²⁸	1986	M	12	11	No	Yes			
Hattab ²⁹	2014	F	9	11	Yes	Yes			DE lingual type 1
Hattab ³⁰	2001	M	10	21	No	Yes			DE lingual type 1
Hosomi ³¹	1989	M	11	21	Yes (necrosis)	NA			
Hülsmann ³²	1997	F	10	11	No	Yes			
Iodice ³	2009	M	13	21	No	Yes			
Kalwitzki ³³	2007	M	15	11, 21	No	Yes	Yes	11–12 and 21–22 fused	
Karaçay ³⁴	2004	M	14	21	No	Yes			
Karaçay ³⁴	2004	M	11	11	No	Yes	Yes		
Karacay ³⁵	2006	M	13	21	No	Yes			12 double tooth
Kayalibay ³⁶	1996	F	8	21	No	Yes			
Kohavi ³⁷	1989	M	10	11	No	Yes			
Le Gal ³⁸	2011	F	12	11, 21	No	Yes			
Libfeld ³⁹	1986	F	22	11, 21	Yes (necrosis)	Yes			
Lomçali ⁴⁰	1994	M	10	11	No	NA			DE lingual type 2
Mader ⁴¹	1980	M	26	21	No	NA			
Mahendra ⁴²	2014	M	27	11, 21	Yes (11)	Yes			
Mancuso ⁴³	2003	M	12	11	No	Yes	Yes (21 bis)		
Marechaux ⁴⁴	1994	M	9	11	No	NA			
Meulien ⁴⁵	1985	M	11	11	No	Yes			
Miri ⁴⁶	2014	M	19	11, 21	Yes	No		11–12 fused	DE 11 lingual type 1
Oelgiesser ⁵	2013	M	11	21	No	Yes			
Ozden ⁴⁷	2012	M	9	21	No	Yes			
Pace ⁴⁸	2013	M	9	21	No	Yes	Yes (11 bis)		
Pair ⁴⁹	2011	F	7.5	11	No	Yes	Yes (21 bis)		
Pearson ⁵⁰	1995	M	8	11, 21	No	Yes			
Peker ⁵¹	2009	M	18	21	Yes	Yes			DE lingual type 1
Pokorny ⁵²	1975	M	60	11, 21	Yes (21)	NA		11–12 and 21–22 fused	
Rada ⁵³	1991	M	25	11	No	NA			
Ramamurthy ⁵⁴	2014	M	9	21	No	Yes			
Reitman ⁵⁵	1976	M	9	11, 21	No	Yes			
Samimi ⁵⁶	2012	F	18	11, 21	Yes	Yes		11–12 and 21–22 fused	
Sammartino ⁵⁷	2014	M	20	11, 21	Yes (necrosis)	Yes		11–21 fused	
Sener ⁵⁸	2012	M	17	11, 21	No	Yes			DE lingual type 1
Sfasciotti ⁵⁹	2011	M	8	11, 21	No	Yes			
Sfasciotti ⁵⁹	2011	M	8	11, 21	No	Yes			

Continued

Table 1 Continued

Study (first author) (reference)	Year	Gender	Age (years)	Teeth involved	Carious lesion	Occlusal interference	Increased dental formula	Decreased dental formula	Associated anomaly
Shapira ⁶⁰	1973	F	9	21	No	NA			
Shetty ⁶¹	2011	M	9	11	No	Yes			DE 21 lingual type 1
Spatafore ⁶²	1992	M	37	11	Yes (necrosis)	NA			
Spuller ⁶³	1986	F	7	11	No	Yes	Yes		
Steinbock ⁶⁴	2014	F	9	21	No	Yes			
Stillwell ⁶⁵	1986	M	11	11, 21	No	Yes			
Strassler ⁶⁶	2010	M	9.5	11, 21	No	No		11–12 fused	
Strassler ⁶⁶	2010	M	15	11	No	NA			
Tarim Ertaş ⁶⁷	2014	M	17	11, 21	Yes (21)	Yes			DE 21 lingual type 1
Thomas ⁶⁸	2008	M	17	11, 21	No	Yes			
Tomazinho ⁶⁹	2009	F	28	11	Yes	Yes			DE lingual type 1
Trebilcock ⁷⁰	1995	M	37	11	No	NA		11–12 fused	
Tsujino ⁷¹	2010	M	9	21	No	Yes			
Türkaskan ⁷²	2007	M	22	11, 21	Yes (11)	NA			
Veeraiyan ⁷³	2009	M	14	11, 21	No	Yes		11–12 and 21–22 fused	
Velasco ⁷⁴	1997	M	9.5	11	No	Yes			
Yuzawa ⁷⁵	1985	M	12	21	No	Yes			

Increased dental formula: presence of a maxillary anterior supernumerary tooth; decreased dental formula: fusion of a central incisor with the other central incisor or with a lateral incisor; associated anomaly: DE, type 1 (true talon) is an additional cusp that projects towards the palatal surface to at least half the length between the cemento-enamel junction and incisal edge, type 2 (semi talon) refers to an additional cusp of ≥ 1 mm in length that extends less than half of the length between the cemento-enamel junction and incisal edge, and type 3 (trace talon) is a protruding cingulum that has a tubercle-like appearance.⁹⁴

DE, dens evaginatus; F, female; M, male; NA, not available.

multidisciplinary approach to address endodontic and aesthetic considerations. Diagnosis of double tooth is based on clinical and radiological examinations. Conventional dental radiographs are not usually sufficient to establish a proper diagnosis.⁵⁸

Therapeutic options for double tooth were restorative dentistry (35%), hemisection (33%), abstention (17%) or extraction (15%). Orthodontic management achieved aesthetics and occlusion in 57% of cases. Probably over the last decade, improved diagnostic (CBCT) and surgical techniques (surgery and restorative dentistry) have limited the indications for extraction or no treatment in some patients. In considering the results of the last

decade only, treatment options have changed slightly. The use of restorative dentistry and hemisection increased (39% and 43%, respectively) and that of no treatment and extractions decreased (11% and 7%, respectively). The proportion of the types of anomalies remained close to the overall findings.

In addition, only 40 case reports reported the monitoring of the patient. The duration of follow-up was 12 months in median (mean 21 months, minimum–maximum 1–120 months). The other 32 included case reports did not report the monitoring of the patient. Consequently, we do not know if a therapeutic option failed or not.

Figure 15 Therapeutic options for the 101 double permanent maxillary central incisors reported in the 72 included case reports.

Our two cases illustrate these therapeutic options. For the two cases, double tooth induced occlusal interferences and created poor aesthetics, resulting in patients having to be treated. For the 11-year-old boy with two double teeth, 11–11 bis and 21–21 bis (case 1), we performed hemisection of 11–11 bis and 21–21 bis. One of the two separated teeth was then removed and the crowns of the remaining teeth were restored, similar to the 25% of cases reported in our systematic review. Another therapeutic option could have been selective grinding of 11–11 bis and hemisection with extraction of 21–21 bis. First, the selective grinding reducing the width of the double tooth 11–11 bis could have eliminated the amorphous shape and achieved normal morphological features, followed by the rehabilitation of 11–11 bis involved composite or ceramic crown. Second, we could have performed hemisection of the double tooth 21–21 bis and extraction of one of the two separated teeth. We could not have preserved the double tooth 21–21 bis as a whole, because the patient needed orthodontic management, and divergence of root axes revealed by CBCT was contrary to performing an orthodontic treatment. For the 9-year-old boy with one double tooth 21 and one supernumerary tooth 12 bis (case 2), we performed extraction of the double tooth 21 and transplantation of the supernumerary incisor 12 bis in-site, similar to the 1% of cases reported in our systematic review. CBCT has been performed because it provided 3D dental imaging to determine the bone volume of the autotransplantation site and the coronary and radicular anatomy of the supernumerary tooth. Thus, the need for CBCT was justified to evaluate the possibility of the autotransplantation of the supernumerary tooth and not to perform the extraction of the double tooth. Moreover, CBCT provides submillimetre spatial resolution with short exposure times in the range of 20 s, and radiation exposure similar to a full mouth series.^{81–84} Another therapeutic option could have been selective grinding of 21 and extraction of 12 bis. First, the selective grinding reducing the width of the double tooth 21 could have eliminated the amorphous shape and achieved normal morphological features, followed by the rehabilitation of 21 involved composite or ceramic crown. Second, extraction of the supernumerary tooth 12 bis was necessary in any cases to avoid aesthetic or occlusal problems.

Our study has some limitations. First, we identified only case reports with an overall low quality of evidence and no randomised trial. Thus, the true clinical relevance of the findings is somewhat lacking. Moreover, we searched only one database and did not search the 'grey' literature, and we acknowledge that unidentified studies may exist. However, our search strategy was extensive and we consulted the largest trial registry, ClinicalTrials.gov run by the US National Library of Medicine at the National Institutes of Health,⁸⁵ to find unpublished randomised trials, and hence the risk of publication bias in our study is low.^{86–87} In addition, in spite of the fact that systematic reviews of randomised controlled trials provide the most reliable evidence about the effects of healthcare interventions, systematic reviews of case reports can be performed in some circumstances to highlight a mistreated specific medical area and stimulate further investigation.⁸⁸ For example, some authors have performed systematic reviews of case reports for cases that are out of the ordinary or for conditions where randomised controlled trials were difficult or impossible to achieve.^{89–92} Our remarks could have implications for future research. Decisions about which treatment is best are driven by the results of randomised trials and systematic reviews.⁹³ In this regard, high-quality randomised trials controlling for clinically relevant parameters and

constraints are needed to determine what therapeutic option is a worthwhile clinical procedure for treating non-syndromic double tooth affecting permanent maxillary central incisors.

CONCLUSION

After an accurate diagnosis of double tooth, complex multidisciplinary treatment is required to preserve dental health and restore aesthetics. A multidisciplinary approach is key to management of permanent maxillary central incisors affected by double tooth.

Learning points

- ▶ A double tooth is among the most challenging problems in dentistry.
- ▶ Owing to the abnormal shape and size of the crown(s) and root(s) as well as misalignment, treatment usually requires a multidisciplinary approach to address both endodontic and aesthetic considerations.
- ▶ Since two-dimensional periapical radiographs cannot be totally conclusive for the diagnosis, cone beam CT should be systematically performed in all cases because it provides three-dimensional dental imaging to help determine the best treatment.

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