The Displaced Lower Third Molar: A Literature Review and Suggestions for Management

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Purpose: To review the literature associated with displaced lower third molars, to introduce a modified method of retrieval of an accidentally displaced lower third molar tooth or root fragment, and to recommend rational guidelines for management.

Materials and Methods: A review of the literature was performed to record the types of displacements, patient's personal data, imaging used, and the surgical approaches with their complications. A modified technique for exploration and retrieval is described.

Results: Nineteen reports were identified and reviewed. Some others could not be translated. In the 32 cases reviewed, there were no gender differences and the third and fourth decades of life were the most common time for this mishap to occur. Fragments were displaced into 5 different tissue spaces. The size of the fragments varied, but the whole tooth and fragment were displaced with equal frequency. Different methods of recovery were used.

Conclusion: The accidental displacement of a lower third molar during attempted extraction is a rare but potentially serious complication. Retrieval should be effected as soon as possible. Because of differences in the direction of displacement, the size of fragment, delay in retrieval, and tissue reactions, no one technique is uniformly applicable. The modified method we suggest appears to save time and have few complications.

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The accidental displacement of a lower third molar or one of its root fragments is not common during extraction, but is nevertheless a well-recognized complication that is frequently mentioned in textbooks. Only limited information about its incidence and management was found in the literature. It usually occurred when the tooth was located lingually, where there is fenestration of the lingual cortical plate with root exposure, and where surgical technique may be inadequate.

Displaced fragments may vary in size and may appear in different tissue spaces. There is variation in the delay between displacement and retrieval. Consequently, no single method of retrieval is applicable to all circumstances. It is possible that this mishap may be under-reported. The aim of this article is to review the literature, to recommend rational guidelines for management of the displaced mandibular third molar tooth or root fragment, and to suggest a modified method of retrieval.

Materials and Methods

LITERATURE REVIEW

Using a PubMed literature search, we identified and reviewed papers using these key words: tooth in submandibular space, tooth in sublingual space, tooth in pharyngeal space, tooth in pterygomandibular space, tooth displaced in soft tissue, displaced mandibular third molar, displacement of mandibular third molar, accidentally displaced mandibular third molar, and lingual displacement in soft tissue of a mandibular

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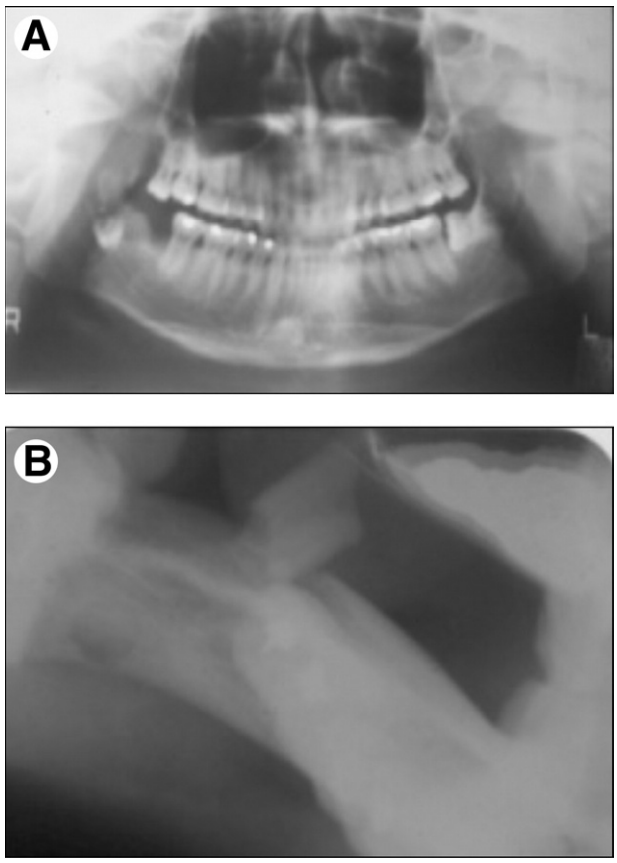

FIGURE 1. *A*, Panoramic film showed the right mandibular third molar root displaced to pterygomandibular space. *B*, Occlusal film showed the fragment from another direction, and the fragment was located at the posterior area of the socket near the lingual plate.

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third molar. Papers were retrieved from 1958 to 2005 and we recorded the case number, age, gender, direction of displacement, size of fragment, complications, time from displacement to retrieval, surgical approach, and complications of retrieval. Papers in English and Chinese were reviewed. Some papers that were not available or which lacked translation were included as references but their data were not included in our overall analysis.

SURGICAL PROCEDURES

When patients were referred to our medical center we would begin by reviewing the original radiograph and if the extracted tooth was available we would estimate the size of any retained fragment. We used a panoramic radiograph and an occlusal film to localize the displaced item (Fig 1). Nerve blocks were administered for the inferior alveolar nerve, lingual nerve, and long buccal nerve similar to a mandibular third molar extraction. We then elevated a mucoperiosteal flap as in the standard extraction technique, or made use of the flap made by the dentist. The socket was cleaned by suction and irrigation to remove clot, so as to examine the socket itself and check the perforation or integrity of the lingual plate. We did not usually elevate the lingual mucoperiosteal flap from the posterior teeth. A U-shaped osteotomy was made at the anterior and posterior margin of the socket, together with a horizontal cut just above the apical level of the socket. This is done very carefully, avoiding penetration of the bone (Fig 2A), and then the lingual plate can be outfractured by tapping gently with a chisel and using finger pressure. Care is taken not to perforate the soft tissue. The lingual plate with mucosa and periosteum attached is retracted lingually to expose the lower part of the socket (Fig 2B). The lingual periosteum is gently elevated anteriorly, posteriorly, and inferiorly to display the root fragment in the sublingual, submandibular space, or pterygomandibular space. Using this method, we found most fragments located immediately inferior to the horizontal bone cut, especially if the fragment was small. These seem not to move far from the socket and are frequently between periosteum and bone and can be removed using a long hemostat, a curette, or even a suction tip. Pressure from beneath the jaw is seldom needed. The wound is then irrigated with normal saline and the displaced lingual plate is reduced into its original position. Allowing this plate to overlap the intact part of the lingual plate may lead to mucosal perforation with bone exposure. The incisions are then closed in the usual manner.

Results

Of 25 papers published on this topic between 1958 and 2005, we were able to retrieve and interpret only 19 (Table 1). Nine articles were excluded from this review: 3 were published before 1950, and 6 were not written in English or Chinese. Some reports lacked sufficient data and are therefore not included in our overall analysis.

Using the modified method of retrieval suggested here, we have successfully treated 7 cases with no lingual nerve injury. Most cases were completed in less than 30 minutes, and no case exceeded 1 hour.

Discussion

In 1958, Howe[1] reported removal of a complete mandibular third molar from the floor of the mouth. Stacy and Orth[2] described the removal of a third molar root fragment from a similar site in 1964. Later reports were often in the form of a "Letter to the Editor" or brief case report(s).[3-17] Some reports focused on localization using computed tomography (CT) scans,[10,11,14,15,17] while others described the surgical retrieval in detail.[18,19] Intraoral, extraoral, and

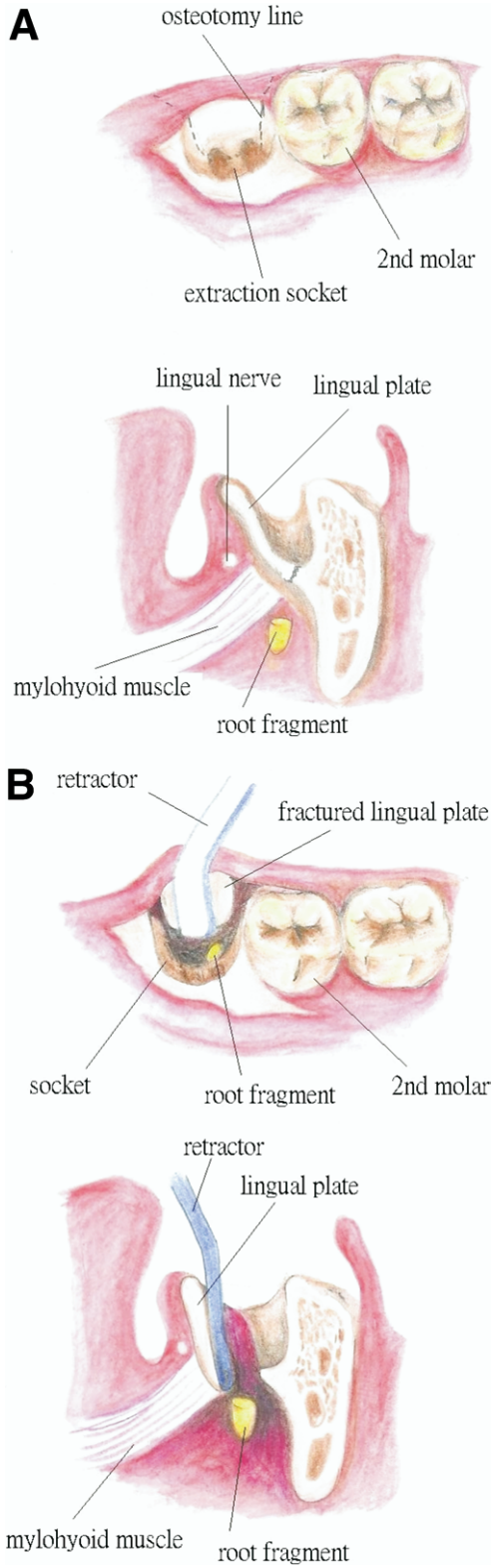

FIGURE 2. Modified retrieval surgery for displaced right mandibular third molar. *A*, Osteotomy of lingual plate of the socket. *B*, Retraction of the lingual plate with soft tissue attachment lingually to expose the fragment.

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combined procedures have been used. An extended lingual mucoperiosteal flap extending from the ramus to (at least) the premolar region may be regarded as the "conventional method" of retrieval.[8,17] This has been criticized as providing an operative field that is narrow and where a prominent mylohyoid ridge may obscure the view.

All third molar extraction cases should be carefully evaluated in advance and significant risks included in the informed consent discussion. Dentists attempting these extractions should follow the general rules regarding adequate access, appropriate bone removal, and avoidance of excessive force. They should be aware that finger guidance may be used to prevent dislocation of the tooth to the lingual side, especially those teeth with distolingual inclination.

What should a dentist do when, during the attempted extraction of the tooth a root fragment "disappears" through the lingual plate? Based on our experience, we recommend that the dentist refrain from an attempt at retrieval unless the fragment is very clearly and easily seen and grasped. Some reports underline the potential for making the situation worse.[6,8,10,12,16] For instance, in the case reported by Grandini et al,[8] the dentist persisted for 6 hours trying to retrieve the fragment, with severe tissue injury. Attempts at retrieval by those with limited training may result in the fragment being pushed deeper into the tissues. Therefore, we recommend that the dentist halt the procedure and refer the patient as soon as possible to an oral and maxillofacial surgeon, together with all the relevant information. This should include the size of the fragment, the circumstances of the extraction, and the radiographs. If there is delay in getting the patient to the care of the surgeon, the dentist is advised to clean the area, suture the wound, and administer antibiotics.

The timing of the retrieval attempt has been the subject of some debate. We favor as early an attempt at retrieval as possible. However, some have argued that delay may favor fibrosis and "stabilization" of the fragment.[10] One case of a third molar displaced into the sublingual space remained asymptomatic at 2 years.[7]

In our review we found that when there was a delay in referral of more than 24 hours the result was more pain, more swelling, and trismus. Furthermore, some reports document infection[8-10] and migration.[10,12]

In some cases the fragment will be palpable. Radiographic localization needs radiographs taken in at least 2 planes. A panoramic film is usual (Fig 1A), but on its own is not adequate. For example, Mellor and Finch[7] describe a case explored on the basis of a panoramic film only; the result was a failed exploration and a later submentovertex view showed the

Table 1. CASE ANALYSIS FROM LITERATURE RETRIEVED

Study	Case No.	Fragment	Time Interval	Side	Gender/ Age	Space	Complications	Anesthesia	Surgical Approach
Howe[1] (1958)	1	Tooth	1 month	R	M/31	Submandibular	None	GA	Intraoral
Stacy and Orth[2] (1964)	1	Root	1 day	L	M/23	Submandibular	None	GA	Extraoral,
Dormer and Babett[3] (1973)	1	Root	1 day	L	M/35	Submandibular	None	GA	Intraoral
Hutchinson[4] (1975)	1	Root	Immediate	R	M/20	Submandibular	None	GA	Intraoral
Ho[5] (1980)	1	Tooth	1 year	L	M/57	Submandibular	None	GA	Intraoral
Pedlar[6] (1986)	1	Crown	6 days	R	M/46	Lateral pharyngeal	Abscess	GA twice	Tonsillectomy and remove (ENT)
Mellor and Finch[7] (1987)	1	Tooth	2 years	L	F/18	Sublingual	None	LA	Intraoral cannot remove
Grandini et al[8] (1993)	2	Root	22 days	L	M/31	Submandibular	Swelling,	LA	Intraoral
		Tooth	3 years	R	M/44	Submandibular	trismus; swallowing pain. Infection	GA	Intraoral
Gay-Escoda et al[9] (1993)	1	Tooth	16 months	R	M/34	Lateral cervical	Infection	GA	Extraoral
Esen et al[10] (2000)	1	Tooth	Months	L	F/24	Lateral pharyngeal	Pain, swelling, trismus, abscess	GA	Tonsillectomy and remove (ENT)
Pippi and Perfetti[11] (2002)	1	Tooth	3 days	L	M/28	Submandibular	None (mild swelling)	GA	Intraoral
Ertas et al[12] (2002)	1	Tooth	Immediate	L	F/28	Lateral pharyngeal	None	LA	Intraoral
Koseglu et al[13] (2002)	1	Tooth	3 days	R	F/34	Sublingual	Pain and swelling	?	?
Tumuluri and Punnia-Moorthy[14] (2002)	1	Root 3 mm	9 days	R	F/28	Pterygo - mandibular	Swelling, trismus	LA	Intraoral
Ozyuvaci et al[15] (2003)	1	Tooth	2 days	R	M/29	Submandibular	Pain, swelling, trismus	GA	Intraoral
Durmus et al[16] (2004)	1	Tooth	2 days	L	F/32	Submandibular	Trismus, slight swelling	LA	Intraoral
De Biase et al[17] (2005)	1	Tooth	3 days	L	M/20	Submandibular	None	GA	Intraoral
Wang and Yang[18] (1999)	11	Root	20 minutes–1 week	?	5 M, 6 F/32–49	Pterygo - mandibular and submandibular	?	LA	Intraoral
Yeh[19] (2002)	3	1 Tooth, 2 Root	?	L	?	Submandibular	?	LA and sedation	Intra- and extraorally

Abbreviations: GA, general anesthesia; LA, local anesthesia; ?, no record.

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displaced tooth to be in the sublingual pouch. A further failed attempt based on a panoramic film also failed.[6]

We recommend the addition of an occlusal film (Fig 1B) to be used in conjunction with the panoramic film. Posteroanterior and submentovertex films have been suggested, but are sometimes less easily obtained.[7,11] The periapical film is of little value in this situation.[9] When necessary, one can resort to a CT scan. The aim is to determine the position of the fragment, whether it is possibly in the lateral pharyngeal or deep cervical space.

Training in the management of this situation should be included in all training programs for oral and maxillofacial surgeons. The situation should be addressed as soon as possible. Where there has already been delay in the referral, one should note any existing nerve injury or infection, and record this carefully.

If the fragment is small and close to the socket, we suggest that our modified method is very suitable.

When the fragment is large and palpable, one may use either the modified method or the conventional method, with pressure upwards from beneath the mandible if needed.

If the fragment is close to the lateral pharyngeal space or deep cervical space, an extraoral approach or a combined intraoral/extraoral approach may be needed (as described by Yeh).[19]

When the fragment is not palpable and the panoramic and occlusal films are inconclusive, a CT scan is indicated.

Many of our cases have been treated in the office of the dentist where the mishap occurred. One author (I.Y.H.) has frequently treated these cases in the office setting, and initially used the conventional approach with a long lingual flap of mucoperiosteum. However, on 1 occasion the lingual plate of the socket was found to be fractured and by careful retraction in a lingual direction the missing root fragment could be seen and recovered in a few minutes. This led to the use of the osteotomized lingual plate flap, in which the bony segment remains attached to the periosteum and can later be replaced into its original position. Of the 7 cases treated in this manner, most were completed within 30 minutes, and all were done in less than 1 hour. This method appears well suited to displacements into the submandibular space and the anteroinferior aspect of the pterygomandibular space.

Wang and Yang[18] reported 11 cases where the lingual plate was fractured in 8 and perforated in 3. They removed the bone segment if it was small but retained it if it was large. Pippi and Perfetti[11] removed their bone fragments because of loss of attachment to the periosteum. In the case reported by Hutchinson,[4] the lingual plate and the tooth were attached to each other. In such a case, we would recommend an attempt to hold the bone with a hemostat and separate the tooth with a slim elevator.

To remove the lingual plate and cut the mylohyoid muscle, described by Stacy and Orth,[2] is usually not necessary. Extraoral and combined extraoral/intraoral approaches have been described.[9,10,19] This may be needed if the fragment is large and distant from the socket, as described by Yeh.[19]

Surprisingly, most reports indicate no injury to the lingual nerve. Some authors recommend identifying and protecting the nerve.[14]

The displaced mandibular third molar is a rare but potentially serious complication of extraction. Every dentist should treat it with care, and when the accident occurs the general dentist should refer the patient to an oral and maxillofacial surgeon as soon as possible. The surgeon should localize the fragment by appropriate imaging and remove it by a technique suited to the situation. Our modified method seems to be suitable for the situation of the small segment and close to the socket.

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