

## REVIEW

**Accidental displacement of third molars; report of three cases, review of literature and treatment recommendations**

R. Anand &amp; P.M. Patil

Department of Oral and Maxillofacial Surgery, School of Dental Sciences, Sharda University, Greater Noida, Uttar Pradesh, India

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**Correspondence to:**

Dr PM Patil  
Department of Oral and Maxillofacial Surgery  
School of Dental Sciences, Sharda University  
Greater Noida 201308,  
Uttar Pradesh  
India  
Tel.: +91 9999970260/9891812068  
Fax: +91 120 2323614  
email: pavanpatil2000@yahoo.co.uk

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**Abstract**

The displaced 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 localise the fragment by appropriate imaging and should remove it by a technique suited to the situation. We present our experience with three displaced third molars: one in the maxillary sinus, one in the submandibular space and one in the pterygomandibular space, all of which were all surgically retrieved without any surgical complications. A review of literature on the subject is examined and a treatment guideline is suggested for use when confronted with such accidents.

**Introduction**

Removal of impacted third molars is a common surgical procedure performed by oral surgeons and dentists alike. As expected with any surgical intervention, accidents may occur during exodontia, such as tooth displacement into the adjacent tissue spaces. The most common sites of dislodgement are the maxillary sinus and the submandibular space<sup>1</sup>.

Iatrogenic displacement of maxillary third molars is a rarely reported complication with an unknown incidence. Maxillary third molars have only a thin layer of bone posteriorly separating them from the infratemporal space and anteriorly separating them from the maxillary sinus. The tooth can be displaced in a posterosuperior direction into the infratemporal space<sup>2</sup>. Displacement of a maxillary third molar into the maxillary sinus also can occur. Excessive apical force during the use of elevators and incorrect surgical technique are quoted as the most usual causes of these accidents.

In the case of a mandibular third molar, the thinness of the lingual cortical bone predisposes to displacement in a lingual direction. Distolingual angulation of the

tooth and excessive or uncontrolled force upon luxation are other causes<sup>3</sup>.

The aim of this article is to report three cases of displaced third molars, to review the literature on the management of such accidents as well as to suggest a rational guideline for management of such accidents.

**Case 1**

A 28-year-old female reported to our unit 8 days after an accident at a local dental clinic during an attempted maxillary third molar extraction. The patient was informed about the mishap and was recommended a visit to an oral and maxillofacial surgeon. The treatment record mentioned that the left upper third molar tooth was lost after a dental elevator was used to luxate the tooth. The patient reported to us 8 days following the accident. The patient complained of mild pain and heaviness in the left maxillary sinus area and the left maxillary sinus was tender on palpation. The dentist had closed the wound area primarily with silk sutures. There were no signs or a symptom of oroantral fistula. The patient's medical history was non-contributory. A

computed tomography (CT) scan was ordered that localised the tooth in the left maxillary sinus close to the posterolateral wall (Fig. 1). A three-dimensional CT reconstruction of the area helped in determining the exact spatial position of the tooth. The patient provided written informed consent. Under general anaesthesia, the maxillary sinus was exposed through a Caldwell-Luc approach. The sinus was irrigated with sterile saline solution under pressure and the tooth was removed only by negative pressure of the suction pump. The wound was closed with polyglactin 910 (Sutures India Pvt. Ltd., Bangalore, India). The patient was prescribed ketoprofen (200 mg/day), oxymetazoline 0.05% nasal drops and amoxicillin (1500 mg/day) were prescribed. The post-operative recovery was uneventful.

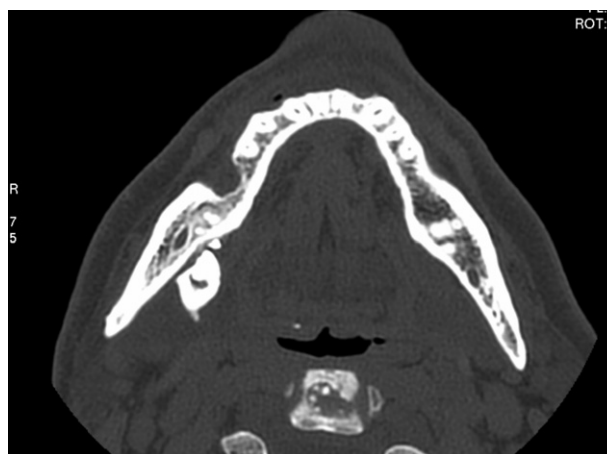
## Case 2

A 38-year-old male was referred to our unit 4 h after a local dentist 'lost' a right lower third molar tooth during an attempted surgical removal at her clinic. The patient's treatment record mentioned that the application of a dental elevator to elevate the tooth led to lingual cortical plate fracture and slipping of the tooth medial to the socket. The patient's medical history was non-contributory. There were no clinical symptoms of dysaesthesia of the lip or tongue. Clinical examination revealed a fractured lingual plate attached to the lingual mucosa in the third molar socket area. The tooth could not be located on palpation. A CT scan was ordered which showed the tooth in the right sub-

mandibular space (Fig. 2). A three-dimensional CT reconstruction of the area was obtained in order to plan the approach to the tooth (Fig. 3). The patient was prepared for surgery under general anaesthesia. He provided written informed consent. A lingual mucoperiosteal flap was raised in the 48 region after making an incision from the medial aspect of anterior border of the mandibular ramus and extending to the lingual gingival sulcus of the mandibular right first premolar tooth. The fractured lingual cortical plate was allowed to remain attached to the lingual mucoperiosteal flap. Blunt dissection was carried out medial to the third molar socket to reach the mylohyoid muscle. A sharp incision was made through the mylohyoid muscle at a distance of 5 mm from its attachment to the mylohyoid



**Figure 1** Axial computed tomography (CT) image showing the tooth placed close to the posteromedial wall of the left maxillary sinus.



**Figure 2** Axial computed tomography (CT) image showing the displaced right lower third molar.



**Figure 3** Three-dimensional (3D) computed tomography (CT) reconstruction image showing a fractured lingual cortical plate and the right lower third molar in the submandibular space.

ridge to make suturing easier at the completion of the procedure. The tooth was located inferior to the muscle. Finger pressure from the fingers on the non-operating hand was used to elevate the tooth into the wound, and the tooth was grasped and delivered using a curved haemostat. Primary closure was achieved with polyglactin 910 for the muscle and mucoperiosteal flap. The patient was placed on a week course of amoxicillin 1500 mg/day and ketoprofen 200 mg/day. Post-operative recovery was uneventful.

### Case 3

A twenty eight year old female reported to our unit with a complaint of *severe pain, difficulty in swallowing and speech*. She gave a history of traumatic surgical extraction of her lower right third molar a month ago at a local dental clinic. She did not recollect having seen the extracted tooth. She was not informed about any mishap during the procedure. Clinical examination revealed an edematous and inflamed lower right third molar area. *The opposing upper third molar was found to be traumatising the retro molar area*. On palpation the tooth could be felt on the medial aspect of the mandibular ramus posteroinferior to the third molar socket. The patient had an Orthopantomograph which showed the tooth displaced into the right pterygomandibular space (Fig. 4). As the tooth was palpable we did not seek a CT scan evaluation. The patient was prescribed Amoxicillin 1500 mg/day, serratiopeptidase 30 mg/day and ketoprofen 200 mg/day. Four days later the symptoms subsided and a surgical procedure was planned under local anesthesia [lidocaine 2% with adrenaline 1:80000, Astra Zeneca Pharma India Ltd]. The patient

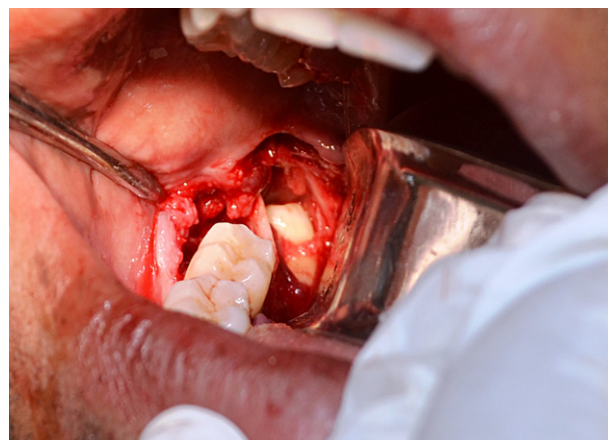


**Figure 4** Orthopantomograph showing right lower third molar in the pterygomandibular space.

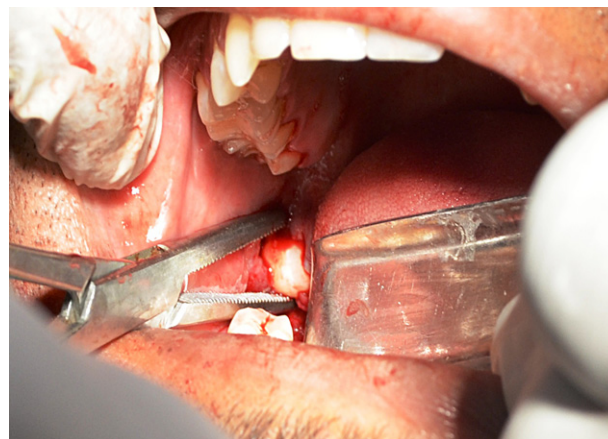
provided written informed consent. An extended lingual mucoperiosteal flap extending from the ramus to the first molar region was raised and blunt dissection carried out with a curved haemostat while maintaining finger pressure on the tooth with the index finger of the non-operating hand. The tooth was found in close relation to the anterior border of the medial pterygoid muscle (Fig. 5). The tooth was grasped with a haemostat (Fig. 6) and delivered (Fig. 7). Closure was achieved with polyglycolic acid 910 sutures. Post-operative recovery was uneventful.

### Discussion

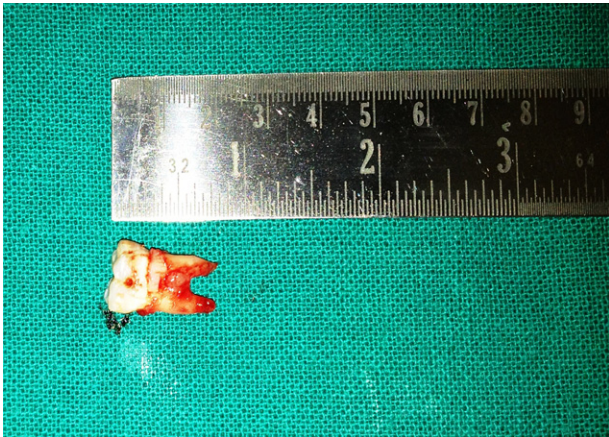
Accidental displacement is a rarely reported complication during the surgical removal of impacted third molars. Unfortunately, there is no sure way of predict-



**Figure 5** Lingual mucoperiosteal flap reflection to expose the displaced third molar.



**Figure 6** Displaced third molar grasped with a haemostat and delivered.



**Figure 7** Extracted lower right third molar tooth.

ing such a transoperative accident, even following a thorough review of past medical history and clinical radiographic examination<sup>4</sup>.

Displaced fragments may vary in size and may appear in different tissue spaces. The delay time between displacement and retrieval varies widely. Consequently, no single method of retrieval is applicable to all circumstances. Some authors prefer to postpone the surgery for several weeks to allow fibrosis to occur and thereby stabilise the tooth in a firm position<sup>5</sup>. A third molar has been reported to have been asymptomatic for 2 years following displacement into the sublingual space<sup>6</sup>. However, the risk of infection, foreign body reaction or migration of the displaced tooth/fragment increases with time<sup>7</sup>. We prefer as early an attempt at retrieval as possible. In case 1, the retrieval was performed on the eighth day after displacement; while in case 2, the retrieval was accomplished 6 h after displacement; and in case 3, 5 weeks after displacement.

### Radiographic assessment

Panoramic, occipitontal and lateral views can be used for radiographic examination to locate the displaced maxillary third molar<sup>2</sup>, while localisation of a mandibular third molar requires posteroanterior, occlusal, submentovertex and panoramic views. A CT scan is used to localise a tooth/fragment when it is deemed to be in deeper tissues spaces like the lateral pharyngeal or deep cervical space<sup>3</sup>. We prefer to use the preliminary radiographs brought by the patients, if any, only for confirmation of the diagnosis of tooth displacement. We routinely use a CT scan with a three-dimensional image reconstruction to precisely locate the tooth in three-dimensional spaces so as to aid in

planning the surgical approach needed in each case. The CT scan is performed as close to the time of operation as possible as the position of the tooth can change with time<sup>8</sup>. The use of CT or cone beam CT should be the preferred imaging modality whenever they are available.

### The maxillary third molar

In cases of accidental tooth displacement into the maxillary sinus, the most accepted treatment is the removal of the dislodged tooth to prevent future infections, preferably during the same surgical procedure, if possible<sup>9</sup>. However, delayed treatment does not always precipitate immediate active sinus disease. Acute infection, though, can develop at any time thereafter<sup>10</sup>. It has been suggested that the initial attempt at retrieval should be a suction placed at the opening into the sinus<sup>9</sup>. If this does not allow delivery, then the sinus may be irrigated with saline and suction tip reapplied to the opening. If the second attempt is unsuccessful, further attempts should be stopped and the patient placed on a course of antibiotics and nasal decongestants. Retrieval can be accomplished with a Caldwell-Luc approach at a second procedure in concert with closure of the orontral fistula and an intranasal antrostomy to facilitate maxillary sinus drainage. We, however, do not perform intranasal antrostomy for maxillary sinus infection drainage.

The maxillary third molar can be displaced in a posteriosuperior direction into the infratemporal space if distal elevation is not accompanied by a retractor placed behind the tuberosity within the designed mucoperiosteal flap. Venous bleeding from the pterygoid plexus often obscures the intraoral visual field. The tooth/fragment can be left in place and observed if needed, but it can require secondary removal in the setting of infection, limited range of motion or a patient wishes to have the tooth removed<sup>9</sup>. Delayed removal after fibrosis takes place around the tooth also has been advocated because it can more easily be localised radiographically and intraoperatively<sup>9</sup>. This secondary procedure is often completed in the operating room under general anaesthesia after a CT scan precisely locates the tooth position. Various approaches to retrieving a tooth in the infratemporal space have been described, including an intraoral approach from a sagittal split osteotomy incision, a hemicoronal approach, and manipulating the tooth via a straight needle placed cutaneously in an inferior direction and delivering it through an intraoral incision<sup>9</sup>. It has been suggested to approach the area via the maxillary sinus, removing

the whole posterior wall<sup>11</sup>. Patel<sup>10</sup> described the combined use of dynamic image intensification and instrumentation through a Gillies approach to manipulate the tooth out into the oral cavity.

Attia<sup>12</sup> described an extra oral approach with wide exposure of the pterygomaxillary fossa but involves considerable morbidity.

## The mandibular third molar

Mandibular third molars may be displaced into the sublingual, submandibular, pterygomandibular and lateral pharyngeal spaces. Lower third molars that are pushed through a perforation in the thin lingual plate

normally pass inferiorly to the mylohyoid muscle<sup>9</sup>. It is recommended that the operator place his or her thumb underneath the lower border of the mandible in an attempt to direct the tooth back along the lingual surface of the mandible. In some cases, the fragment will be palpable.

The 'conventional' method of retrieval may be thought of as an extended lingual mucoperiosteal flap extending from the ramus to (at least) the premolar region<sup>13</sup>. This flap has been criticised for providing an operative field that is too narrow and where a prominent mylohyoid ridge may obscure the operators view. In order to overcome these shortcomings, the mylohyoid muscle may be incised to gain access to the

**Table 1** Review of recent reports of accidental displacement of third molars

Authors	Year of publication	Clinical details	Complications
Ozyuvaci H, Firat D, Tanyel C <sup>17</sup>	2003	Mandibular third molar displaced into the submandibular space. Surgical removal was accomplished intraoral.	None
De Biase A <i>et al.</i> <sup>18</sup>	2005	Mandibular left lower third molar root displaced into the medial soft tissue space. Surgical removal was accomplished intraoral.	None
Sverzut CE <i>et al.</i> <sup>19</sup>	2005	Maxillary right third molar displaced into the maxillary sinus. Surgical removal accomplished intraoral via the Caldwell-Luc approach.	None
Medeiros N, Gaffrée G <sup>20</sup>	2008	Mandibular left third molar displaced into the lateral pharyngeal space. Surgical removal accomplished intraoral.	None
Olusanya AA, Akadir OA, Akinmoladun VI <sup>21</sup>	2008	Mandibular third molar displaced into the submandibular space. Surgical removal accomplished intraoral.	None
Kocaelli H, Balcioglu HA, Erdem TL <sup>22</sup>	2011	Maxillary third molar displaced into the buccal space. Surgical removal accomplished intraoral.	None
Selvi F <i>et al.</i> <sup>23</sup>	2011	Maxillary left third molar displaced into the infratemporal space. Surgical removal accomplished intraoral.	None
Shahakbari R, Mortazavi H, Eshghpour M <sup>24</sup>	2011	Mandibular third molar displaced into the infratemporal space. Surgical removal accomplished intraoral.	None
Aznar-Arasa L, Figueiredo R, Gay-Escoda C <sup>25</sup>	2012	Mandibular third molar roots displaced into the sublingual space (report of six cases). Three of these were removed via an intraoral approach following complication at the surgical site while two remained symptom free. One was removed within the same surgical procedure.	Infection and swelling (one case), lingual and inferior alveolar nerve transitory impairment (two cases)
Iwai T <i>et al.</i> <sup>26</sup>	2012	Maxillary third molar displaced into the maxillary sinus removed via the tooth socket using an endoscope.	None

**Table 2** Treatment suggestions in case of accidental displacement of third molars

1. Patient should be promptly informed about the accident and the possible treatment options should be fully discussed.
2. In the event, the professional is not experienced and skilled enough to perform the retrieval surgery, and/or the patient is not in physical and/or psychological conditions to support the surgical intervention within the same session, surgery is postponed to a next date when the patient feels more comfortable. Referral to a skilful oral-maxillofacial surgeon is the conduct of choice. In the meantime, between the first and second interventions, the patient must be under antibiotic, analgesic and anti-inflammatory medication.
3. Where there has been a delay in the referral, one should note any existing nerve injury or infection, and record this carefully.
4. The maxillofacial surgeon should localise the tooth/root radiographically in at least two planes or ideally with a computed tomography (CT) scan or cone beam CT and at the earliest plan the proper surgical approach necessary to retrieve the fragment.
5. In case the fragment is small (1/3rd of the root length or less) and has no symptoms/complications associated with it, the maxillofacial surgeon may choose to leave it in place.

submandibular space and deliver the tooth. However, care should be taken to avoid injury to the lingual nerve. Yeh<sup>14</sup> described a combined intraoral and lateral neck approach in which the original wound is extended lingually to the distal of the first molar. This is combined with a 4 mm skin incision made in the submandibular region. A haemostat is then inserted along the lingual surface of the mandible to stabilise the tooth while the surgeon palpates the tooth with an index finger. A Kelly clamp can be inserted to deliver the tooth upward into the mouth. This method is believed to limit further displacement of the tooth and limits the length of lingual flap reflection necessary. This method may be used when the fragment is large and distant from the socket<sup>14</sup>.

Huang and colleagues<sup>3</sup> described a 'modified method', an osteotomised lingual plate flap in which the bony segment remains attached to the periosteum and can be replaced into its original position. This method is suitable if the fragment is small and close to the socket. If the fragment is large and distant from the socket, one may use the modified or 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 extra oral approach or a combined intraoral/extra oral approach may be needed (as described by Yeh)<sup>14</sup>. To remove the lingual plate and cut the mylohyoid muscle, described by Stacy and Orth, is usually not necessary<sup>15</sup>. It cannot be understated that careful retraction of the lingual flap preferably by a trained assistant is of paramount importance during the retrieval surgery. Some authors recommend identifying and protecting the nerve<sup>16</sup>.

Gay-Escoda and colleagues<sup>7</sup> reported a case in which the displaced tooth was retrieved via a transcutaneous approach as the tooth was located between the sternocleidomastoid and the platysma muscles as a result of progressive exteriorisation due to a prolonged inflammatory reaction. Esen and colleagues<sup>5</sup> described a case in which a mandibular third molar was removed transorally from the tonsillar fossa through a vertical incision from the tonsillar fossa to the retromolar trigone after completion of a tonsillectomy.

A number of similar reports have appeared in recent years (Table 1), underlining the regularity with which such incidences occur in oral surgical practice, although infrequently. The suggested course of action in such situations is outlined in Table 2. Adherence to the suggested protocol following will ensure a safe and uneventful outcome for the patient, at the same time reinforcing the patient's belief in the dentist's practice.

## Conclusion

The displaced third molar is a rare but potentially serious complication of extraction. Dental professionals can be faced with medical-legal problems following such complications. It is thus of paramount importance to keep all case records, including signed informed consent, radiographs and other items, as well as to inform the patient immediately about any intraoperative accident that occurred during exodontia and discuss which conduct will be followed to solve the unexpected situation. Timely intervention and referral to a maxillofacial surgeon could prevent further complications.

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