Inverted Maxillary Third Molar Impactions

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Abstract
Maxillary third molars are one of the most commonly impacted teeth, but its inverted type is very rare. Five cases of inverted and impacted maxillary wisdom teeth are described here. Two were symptomatic and required transalveolar extractions, while three were conservatively managed. Complications may arise from surgical removal of inversions, and so, removal must be carefully weighed against the benefits of retaining them. This case series discusses the rare occurrence of impacted inverted maxillary third molars, its increased incidence in the Indian population, and the dilemma considering its treatment options. If left untreated, regular follow-up should be done to note for any complication.

Keywords: Impacted tooth, inverted molar, lateral transposition, maxillary impaction, third molar

Introduction
Impacted teeth are prevented from eruption due to multifactorial causes such as lack of space in the dental arch or obstruction in their eruptive pathway.[1] Unusual proliferation of odontogenic epithelium during tooth germ formation leads to the deviation of the developing tooth from its routine location. Maxillary and mandibular third molars and maxillary canines are the most frequently encountered impactions in descending order.[2] Impacted maxillary molars though quotidian may rarely be displaced to the floor of the maxillary sinus, the orbital floor, or may be horizontally placed or inverted vertically, complicating removal.[3] Inversion is “the malposition of a tooth in which the tooth has reversed and is positioned upside down.”[3] Impacted inverted maxillary third molars are very rare. Hereby described are the inverted maxillary third molar impactions which we encountered over 4 years.

Case Reports
Case 1
A 40-year-old male had pain in his upper right back tooth and was diagnosed with having an impacted and inverted maxillary wisdom tooth adjacent to a carious second molar on orthopantomogram (OPG) [Figure 1a]. After being informed of the possible treatment options and complications, he opted for surgical removal of 18 with root canal treatment in 17. Transalveolar extraction was performed by removing the bone overlying 18, luxating and laterally transposing the tooth, and removing it in toto. The extraction site was examined to have no perforation of the sinus floor [Figure 1b]. Healing was satisfactory, and the patient continues follow-up.

Case 2
A female patient of 27 years presented with pain and swelling over the right upper back tooth region since 2 months which did not subside even with antibiotics. Her OPG revealed an impacted and inverted right maxillary third molar [Figure 2a]. Aspiration of the swelling revealed a dirty-colored fluid [Figure 2b] with pus and protein content >5 mg/dl when subjected to biochemical examination. She was subsequently subjected to transalveolar extraction of the same by cautious and extensive bone guttering and deroofing of 18 on its buccal aspect for lateral transposition. Enucleation of the follicular lining was done along with tooth extraction [Figure 2c]. Although the maxillary sinus floor was breached during removal, an intact sinus lining remained. Histopathological evaluation of the follicle revealed a dentigerous cyst. The patient was kept on antihistamines and nasal decongestants prophylactically. The
patient was relieved of her presenting symptoms and healing was uneventful. On sequential follow-up of 6 months, no postoperative complications were observed.

**Case 3**

A 54-year-old female who reported for extraction of multiple root stumps and grossly carious teeth was diagnosed with an inverted impacted 28 on routine radiographs [Figure 3a and b]. On being informed of the same and the possible treatment options, she opted for conservative management since she was asymptomatic with no associated pathological findings. She continues follow-up.

**Case 4**

A 38-year-old male patient was diagnosed with an impacted and inverted maxillary third molar (28) when he was subjected to cone-beam computerized tomography for consideration of implant placement to replace his missing lower left molars [Figure 4]. Since he was asymptomatic and showed no pathological changes, the patient did not undergo any treatment for the same but is on follow-up.

**Case 5**

A 47-year-old female who reported for sensitive and carious teeth was diagnosed with an inverted impacted 28 on routine radiograph [Figure 5]. On being informed of the same, she opted for conservative management as she was asymptomatic and continues follow-up.

**Discussion**

Maxillary third molar impactions can be classified based on their anatomical position according to their relative depth in the bone (Class A, B, and C), with respect to the long axis of maxillary second molars (Position I, II, and III), and according to their relationship to the maxillary sinus (showing sinus approximation or no sinus approximation). Inverted...
impacted maxillary molars are the rarest to come across with their crown pointing upward and the root apex pointing toward the alveolar crest - a complicated impaction. The inverted maxillary third molars usually stay at their position for years without clinical manifestations but rarely may lead to complications, such as ectopic eruption into the nasal floor, resorption of the adjacent tooth, crowding, diastema formation, or development of pathology. The first case of inverted maxillary third molar impaction was reported in 1973 and since then, very few have been reported till date [Table 1]. The high number of cases presented could be indicative of predisposition of the Indian population to inverted maxillary impactions with maximum literature from the same subcontinent as well.

No fixed treatment protocol exists for inverted upper third molar impactions. The decision about their treatment is of paramount importance, although they are sparsely encountered. Conservative treatment is the ubiquitous choice, being the safest, particularly if barriers of bone and mucosa against infections are intact and are free of any pathology. Inverted impacted maxillary molar warrants removal if the tooth follicle has an associated pathology or the patient is symptomatic and surgical management should be instituted at the earliest. Sometimes, even asymptomatic patients may need surgical intervention owing to the possibility of infection.

Surgical intervention for inversions is more formidable than for other maxillary molar impactions due to their challenging access. This is due to the greatest diameter of the crown being upward toward the floor of maxillary sinus, which requires aggressive and exhaustive bone gutting in the maxillary tuberosity region. This leads to a significantly larger extraction socket as compared to normal which is a major disadvantage as it negatively affects the prosthetic rehabilitation when required. Extensive loss of bone during removal also leads to longer healing periods as inversions are complete bony impactions.

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Table 1: Incidence of inverted maxillary third molars impactions reported in literature

| Year | Authors | Impacted maxillary third molar inversions |
|------|---------|------------------------------------------|
| 1973 | Gold J and Demby N | First reported case |
| 1979 | Held HW | Rare single case |
| 2001 | AlShamrani SM | Reported two cases |
| 2008 | Pai V, Kundabala M, Sequier PS, Rao A | A single, rare inversion |
| 2011 | Yuvaraj, Agarwal GD | A case report |
| 2012 | Mohan S, Kankariya H, Fauzdar S | Possible treatment protocols. Associated cyst |
| 2012 | Chhabra S, Chhabra N, Dhillon G | Removal by lateral transposition method |
| 2013 | Togoo RA | Rare case report |
| 2014 | Ching-Yi C, Wen-Chen W, et al. | Chance find of a contralateral mandibular ameloblastoma |
| 2014 | Das V, Das RD, Nemane A | Unusual associated symptoms |
| 2015 | Nedal Abu-Mostafa et al. | Bilateral inverted maxillary third molars |
| 2015 | Ranjana J, Supritha M, Praveen C, Kulkarni D | A rare incidental finding on CT |
| 2016 | Popli G, Bansal V, et al. | A rare occurrence |
| 2016 | Sachdeva SK, Jayachandran S, et al. | Unusual case reports with literature review |

CT=Computed tomography
Agarwal, et al.: Inverted maxillary third molar impactions

We thus present extremely rare cases of inverted and impacted third molars in the maxilla, which were subjected to either conservative or surgical management. This case series adds to the present limited academic literature available on impacted maxillary molar inversions and highlights the probable predisposition of Indians for these which should be investigated further.

**Conclusion**

The treatment of inverted impacted teeth should depend upon the patient’s complaints, clinical findings, presence of associated pathology, and choice of surgical technique. Conservative treatment is the ubiquitous choice for inverted upper third molar impactions, being the safest, but surgical intervention can be carried out after carefully weighing the possible complications that can arise.

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**Conflicts of interest**

There are no conflicts of interest.

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**Table 2: Complications associated with surgical extraction of impacted maxillary third molars**

| Literature                        | Complications with impacted maxillary third molar removal                                                                 |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Archer, 1975                      | Displacement of tooth, tuberosity fracture, damage to second molar                                                       |
| Winkler et al., 1977               | Tooth displacement into infratemporal space                                                                              |
| Oberman et al., 1986               | Accidental displacements of impacted maxillary third molars                                                               |
| Gulbrandsen et al., 1987           | Tooth displacement into infratemporal space                                                                              |
| Alling, 1993                       | Maxillary tuberosity fracture, fusion with second molar, alveolitis                                                      |
| Dawson et al., 1993                | Tooth displacement into infratemporal space                                                                              |
| Patel M et al., 1994               | Accidental displacement of impacted maxillary third molars                                                               |
| Wachter and Stoll, 1995            | Oroantral communication                                                                                                 |
| Anderson et al., 1998              | Tooth displacement into sinus, risk of bleeding, alveolar fracture                                                       |
| Cassio ES et al., 2005             | Displaced into maxillary sinus                                                                                           |
| Munoz-Guerra, 2006                 | Subperiosteal abscess of the orbit                                                                                        |
| Dimitrakopoulos, 2007              | Displacement of a maxillary third molar into the infratemporal fossa                                                     |
| Rothamel et al., 2007              | Oroantral communication                                                                                                 |
| Voegelin et al., 2008              | Abscess, infection                                                                                                       |
| Sverzut C. E et al., 2009          | Tooth displacement into infratemporal space                                                                              |
| Goshlashby et al., 2010             | Retrobulbar hemorrhage with proptosis                                                                                     |
| Gómez et al., 2010                  | Displacement into infratemporal fossa                                                                                     |
| Selvi F. et al., 2011               | Tooth displacement into infratemporal space                                                                              |
| Kocaelli et al., 2011               | Displacement of a maxillary third molar into the buccal space                                                            |
| Bodner et al., 2012                 | Tooth displacement into infratemporal space                                                                              |
| Kanagasabapathy et al., 2013        | Maxillary tuberosity fracture, subconjunctival hemorrhage following extraction of maxillary third molar                   |
| Özzer N et al., 2013                | Displacement into pterygopalatine fossa                                                                                 |
| Lee D et al., 2013                  | Displacement into the lateral pharyngeal space                                                                           |
| Das V et al., 2014                  | Severe pain, numbness over mid-face and TMJ, ear fullness, blurred vision                                               |
| Pourmand et al., 2014               | Oroantral communication, alveolitis, tooth displacement                                                                   |
| Carvalho et al., 2014               | Bleeding, laceration of flap, crown/root fracture, tuberosity fracture, oroantral communication                           |
| Rammal et al., 2014                 | Displacement into infratemporal fossa or maxillary sinus                                                                 |
| Jayan R et al., 2015                | Excessive bone removal, infection                                                                                        |
| Popli et al., 2016                  | Oroantral communication                                                                                                 |
| Kajla et al., 2016                  | Tooth displacement into infratemporal space                                                                              |

TMJ=Temporo mandibular joint

sinus and pterygoid plates and completely within bone. After careful clinical and radiographic examination, surgical treatment by bone guttering, lateral transposition, and removal was done with uneventful healing. Dentigerous cyst in one of our cases with two reports in literature[11,13] highlights the possibility of developing these if left untreated in bone. No other associated pathologies have ever been reported, with only an accidental contralateral unicystic ameloblastoma noted in a patient.[13]

Although no complication postsurgery was observed, it is always a possibility and patients should be kept on follow-up. Those inversions that were left unoperated were due to the absence of any indication for removal, unwillingness for surgery, and possibility of a reduced tuberosity region which decreases the stability of proposed prosthesis in those individuals.

With recent advents in armamentarium and surgical expertise, removal of these inverted impacted maxillary molars can be attempted. The advent of fiber-optic endoscope in dentistry, which can be used to remove such tooth from sinus or nasal cavity, can greatly reduce the associated morbidity.[18]
References

1. Shafer WG, Hine MK, Levy BM. A Textbook of Oral Pathology. 4th ed., Vol. 1. Philadelphia: WB Saunders; 1983. p. 66-8.
2. Dachi SF, Howell FV. A survey of 3, 874 routine full-month radiographs. II. A study of impacted teeth. Oral Surg Oral Med Oral Pathol 1961;14:1165-9.
3. Kuroda H, Tsutsumi K, Tomisawa H, Koizuka I. A case of an inverted tooth in the nasal cavity. Auris Nasus Larynx 2003;30 Suppl: S127-9.
4. Pell GJ, Gregory BT. Impacted mandibular 3rd molars: Classification and modified techniques for removal. Dent Dig 1933;39:330-8.
5. Pell GJ, Gregory GT. Report on a 10 years old study of a tooth division technique for the removal of an impacted tooth. Am J Orthod Oral Surg 1942;28:660-6.
6. Popli G, Bansal V, Dubey P, Bansal A, Mohan S. Inverted impacted maxillary third molar: A rare occurrence. Int J Oral Health Med Res 2016;3:101-2.
7. Kugelberg CF, Ahlström U, Ericson S, Hugoson A, Kvint S. Periodontal healing after impacted lower third molar surgery in adolescents and adults. A prospective study. Int J Oral Maxillofac Surg 1991;20:18-24.
8. Anderson M. Removal of asymptomatic third molars: Indications, contraindications, risks and benefits. J Indiana Dent Assoc 1998;77:41-6.
9. Held HW. Inverted maxillary molar. Dent Radiogr Photogr 1979;52:87.
10. Yuvaraj, Agarwal GD. Inverted maxillary third molar impaction – A case report. Peoples J Sci Res 2011;4:57-8.
11. Gold J, Demby N. Rare inverted maxillary third molar impaction: Report of case. J Am Dent Assoc 1973;87:186-8.
12. Pai V, Kundabala M, Sequier PS, Rao A. Inverted and impacted maxillary and mandibular 3rd molars; a very rare case. J Oral Health Community Dent 2008;2:8-9.
13. Mohan S, Kankariya H, Fauzdar S. Impacted inverted teeth with their possible treatment protocols. J Maxillofac Oral Surg 2012;11:455-7.
14. Knutsson K, Brehmer B, Lysell L, Rohlin M. Pathoses associated with mandibular third molars subjected to removal. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1996;82:10-7.
15. Abu-Mostafa N, Barakat A, Al-Turkmani T, Al-Yousef A. Bilateral inverted and impacted maxillary third molars: A case report. J Clin Exp Dent 2015;7:e441-3.
16. Alling C, Helfrick J, Alling R. Impacted Teeth. Philadelphia: Saunders; 1993.
17. Ching-Yi C, Wen-Chen W, Li-Min L, Yuk-Kwan C. Incidental detection of a rare inverted and impacted maxillary third molar in a patient of mandibular unicystic ameloblastoma. Dentistry 2014;4:213.
18. Saleem T, Khalid U, Hameed A, Ghaffar S. Supernumerary, ectopic tooth in the maxillary antrum presenting with recurrent haemoptysis. Head Face Med 2010;6:26.