

Correlation between paresthesia postsurgical removal of third molars and type of impaction of third molar- A retrospective observational study

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Abstract:

Background: Impacted teeth can be defined as those teeth whose normal eruption is prevented by adjacent tooth, overlying bone or soft tissue, malpositioning and lack of space in the arch, or other impediments. During surgical removal, each of these nerves (IAN, Lingual nerve, buccal nerve) at risk of damage, but the most troublesome complications result from inferior alveolar or lingual nerve injuries. The majority of injuries result in transient sensory disturbance but, in some cases, paraesthesia (abnormal sensation) can occur.

Aim: The aim of the study is to systematically review the data about paresthesia post extraction of third molars and the type of impaction in which parasthesia occurs the most in different age groups.

Method:A cross-sectional study was conducted amongst the patients in saveetha dental college from the Department of oral surgery. The research sample included patients with a history of impacted mandibular third molar surgical extraction using local anesthesia. Patients' impaction records were taken from the DIAS such as age, sex, angulation of impaction, medication and symptoms of paresthesia.

Results:Patients who had mesioangular impaction experienced paresthesia compared to other type of impactions.

Conclusion: paresthesia occurs widely from the age group of 18-30. Although these figures are relatively low, they are still of great significance for both patients and clinicians. The factors associated with a significantly higher incidence of paresthesia includes patients with mesioangular type of impaction. In order to reduce the neurological risks, alternative strategies might be used like coronectomy and orthodontic extraction techniques.

Keywords: third molar impaction, paresthesia, cross sectional study

Introduction:

Impacted teeth can be defined as those teeth whose normal eruption is prevented by adjacent tooth, overlying bone or soft tissue, malpositioning and lack of space in the arch, or other impediments. Impacted mandibular 3rd molar is one of the most common findings which is detected on routine dental checkup. However the patient seeks treatment whenever there is pain, swellings or another discomfort.(Peterson, 2012)

Although the overall complication rate is low and most complications are minor, third molar removal is so common that the population morbidity of complications may be significant. As such, efforts to limit intraoperative or postoperative complications may have a great impact in terms of enhancing patient outcome.(Liedholm, 2005)

Impacted mandibular third molar teeth are in close proximity to the lingual, inferior alveolar, mylohyoid, and buccal nerves. During surgical removal, each of these nerves is at risk of damage, but the most troublesome complications result from inferior alveolar or lingual nerve injuries. The majority of injuries result in transient sensory disturbance but, in some cases, permanent paraesthesia (abnormal sensation), hypoesthesia (reduced sensation) can occur. These sensory disturbances can be troublesome, causing problems with speech and mastication and may adversely affect the patient's quality of life. The occurrence of paresthesia can vary among patients and may be influenced by several factors, including the type of impaction of the third molar.

Third molar impactions are classified based on their angulation and depth within the jawbone, with variations that include mesioangular, distoangular, vertical, horizontal, and transverse impactions. Each type of impaction poses unique challenges during extraction, and these differences may play a role in the development of paresthesia as a postoperative complication.

This study aims to investigate the potential correlation between the type of impaction of third molars and the incidence of paresthesia following surgical extraction. By examining a diverse patient population and analysing relevant clinical data, we aim to shed light on whether specific impaction patterns are associated with a higher risk of paresthesia(Vié, Hilton-Taylor and Stuart, 2009). Understanding such associations can provide valuable insights for oral surgeons, dentists, and patients in making informed decisions about the management of third molar impactions and minimising the risk of postoperative paresthesia. The aim of the study is to systematically review the data about paresthesia post extraction of third molars and the type of impaction in which parasthesia occurs the most in different age groups.

Methodology:

A cross-sectional study was conducted amongst the patients in Saveetha dental college by obtaining patient details from the Department of Oral and Maxillofacial Surgery. The research sample included patients with a history of impacted mandibular third molar surgical extraction using local anesthesia. A total of 300 patients' impaction records were taken from the archives such as age, sex, angulation of impaction, medication and symptoms of paresthesia after obtaining consent from the patients through telecommunication.

Results:

Age

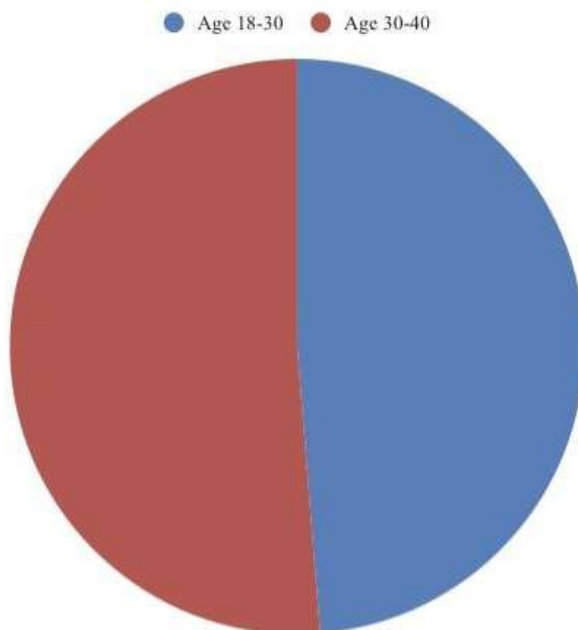


Fig.1 shows the age group of the patients who had impaction . Over 48% of the patients were 18 to 30 years (blue) .Over 52% of the patients were in the age group of 30-40 (red)

Type of Impaction (18-30)

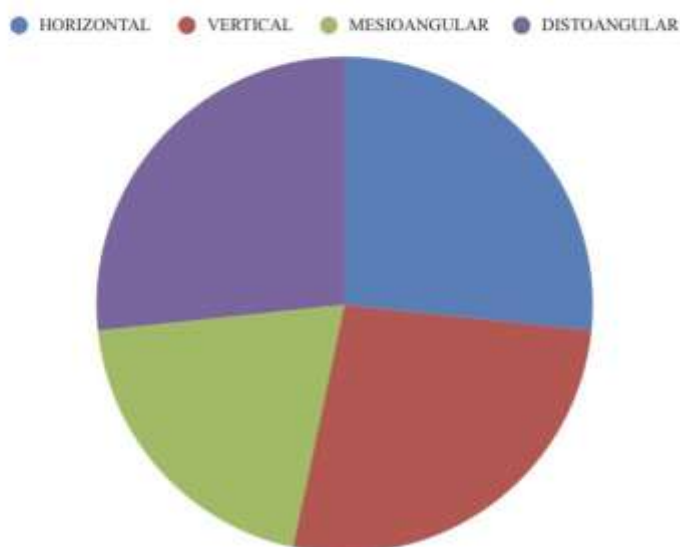


Fig.2 shows the type of impaction in the age group of 18-30. 26% of the population had horizontal, vertical and distoangular type of impaction, whereas 21% of the population had mesioangular type of impaction.

Type of Impaction (30 - 40)

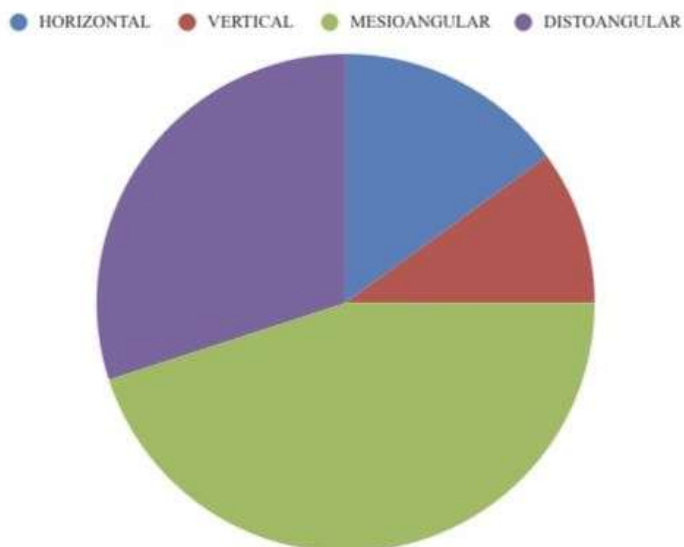


Fig 3 shows the type of impaction in the age group of 30-40. 45% of the population had mesioangular type of impaction, 30% of the population had distoangular. 15% of the population had horizontal type of impaction and 10% of the population had vertical type of impaction.

Parasthesia (18-30)

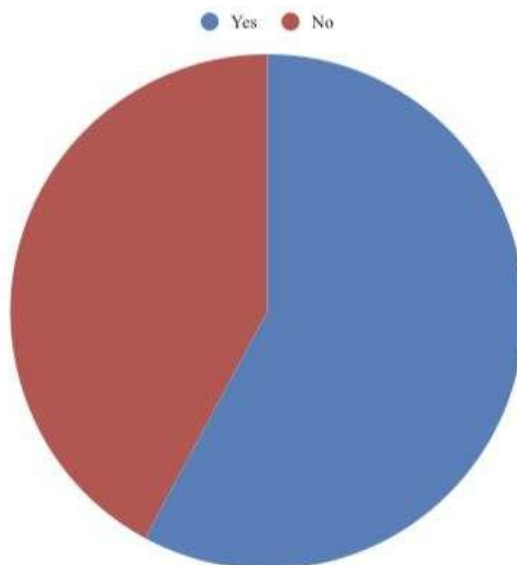
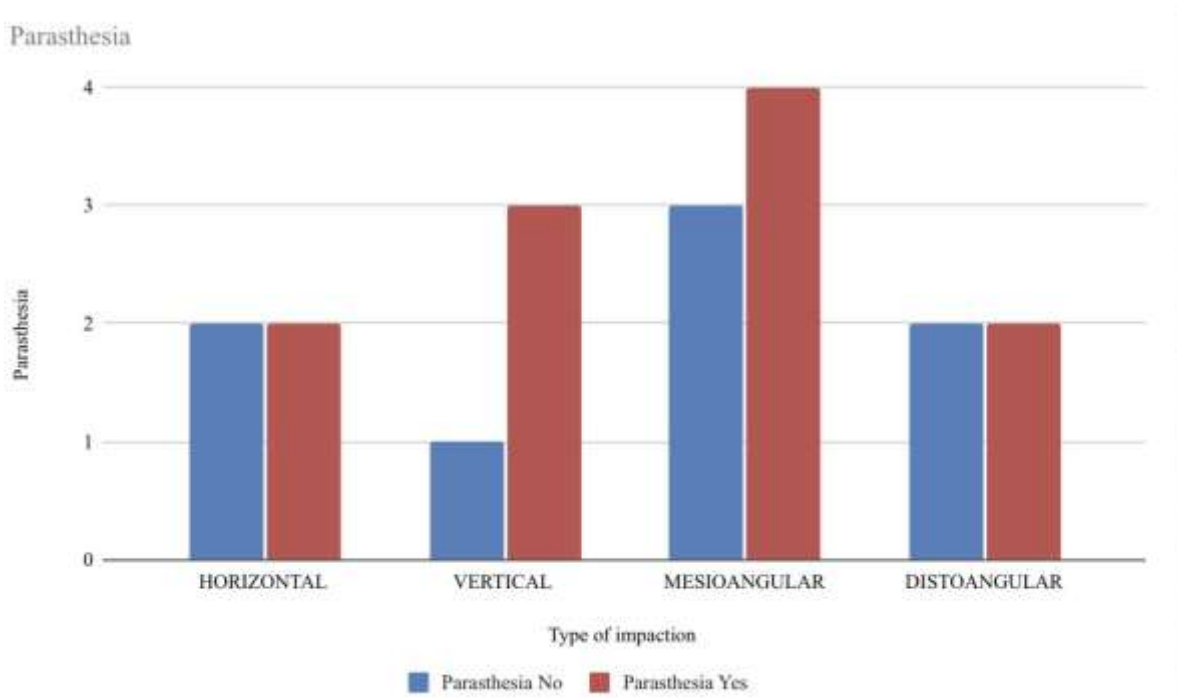


Fig 4: shows the percentage of the population in the age group of 18-30 who have experienced parasthesia or not post impaction. Over 57% of the population has experienced parasthesia post impaction(yes- blue), whereas 43% of the population has not experienced parasthesia (no- red)

Parasthesia (30-40)



Fig 5 shows the percentage of the population in the age group of 30-40 who have experienced paresthesia or not post impactation. Over 52% of the population has experienced paresthesia post impactation(yes- blue), whereas 48% of the population has not experienced paresthesia (no- red)



bar graph showing comparison of responses between different type of impactations and presence of paresthesia post extraction. X- axis represents the type of impactation (horizontal, vertical, mesioangular, distoangular) of the respondents and Y- axis represents the number of responses who had paresthesia post extraction(red - yes, blue - no). Patients who had mesioangular impactation experienced paresthesia compared to other type of impactations.

Discussion:

The incidence of IAN damage after lower 3M removal ranges from 0.5% to approximately 8% . A review of prospective, large sample (at least 300 operations) observational studies not including the lingual split technique, that focused on IAN injury in 3M surgery, resulted in

an incident range of 1.3% to 3.6% at 1 week after surgery(Brand *et al.*, 2015).

In this study, removal of impacted mandibular 3Ms by buccal bone removal without raising a lingual flap resulted in very low incidence of lingual nerve sensory alteration 0.08% (1/1276 teeth) and IAN sensory alteration in 0.62% (8/1276 teeth) at 1 week after surgery(Bell, 2004). The patient with LN paresthesia had complete spontaneous recovery within 3 months.

(Gülicher and Gerlach, 2001)reported incidences of 3.6% IAN paresthesia and 2.1% LN paresthesia following removal of impacted mandibular third molars. Wofford and Miller reported an incidence of 3.3% IAN paresthesia in their prospective study, also concluded that the incidence of paresthesia of IAN and LN is more likely to occur with complete bony impacted mandibular molars, mesioangular impaction, impacted molars with the crown at the cervical junction of the adjacent second molars, when burs are used to remove bone and when roots are in close proximity to the mandibular canal.

(Bataineh, 2001) reported incidences of 3.9% IAN paresthesia and 2.6% LN paresthesia. Their statistical analysis showed that paresthesia was unrelated to age, gender, site, angulation of tooth impaction, grade of operator, removal of bone or tooth division, which is consistent with the findings of our audit.

In 2013, Smith presented a clinical study on 1000 patients, removing 1589 impacted 3Ms. Of the 1589 3Ms extracted, 466 (29%) demonstrated a distant relationship of their apices to the mandibular canal, 869 (55%) were close to the canal, and only 254 (16%) were deemed to be intimate to the canal by radiography. After surgery, 39 patients (3.9%) reported neurosensory disturbance in the IAN in 40 sites (2.5%). Seven patients (0.7%) sustained permanent sensory loss. The incidence of IAN neurosensory deficit was highest with horizontal impaction (4.7%) and lowest when the teeth were vertically impacted (0.9%). (Smith, 2013)

(Sarikov and Juodzbaly, 2014)reported the incidence of injury to IAN after 3M removal to be 0.35–8.4%, with risk factors that may increase the injury to the nerve including patient age over 24 years, horizontal impaction in close radiographic proximity to the mandibular canal and extraction by trainee surgeons.

(Tay and Go, 2004)Clinical observation of the neurovascular bundle exposed in the socket during surgery indicates an increased risk of postoperative IAN sensory disturbance. Tay and Go found that an intact IAN bundle observed during 3M surgery indicated an intimate relationship with the 3M and had a 20% risk of postoperative paresthesia, and with a 70% chance of recovery within 1 year.

(Liedholm, 2005)showed that the significant factors for neurosensory deficits according to the panoramic radiograph were the 5 radiographic superimposition signs: darkening of roots, deflection of roots, narrowing of roots, dark and bifid apex of roots and narrowing of the canal were significantly associated with neurosensory deficits of the IAN after impacted mandibular third molar extraction. The number of subjects in this study was significantly

large (12,842 patients), increasing the reliability of their results.

In our audit, there was no single important radiological sign in patients who had postoperative paresthesia in contrast to diversion of the mandibular canal near the third molar roots. The interruption of white line of the mandibular canal and darkening of the roots were the most common radiological signs noted in our audit. Valmaseda's study also suggested patients' age, presence of radiological relationship between 3Ms and the mandibular canal, deflection of mandibular canal and need for distal bone as predictors for IAN damage, which is in contrast to the findings in our audit where statistical analysis revealed that paresthesia was unrelated to age, site, angulation of tooth, presence of any particular radiological sign.

Dental panoramic radiography was the radiological investigation of choice before 3M surgery. The radiographic signs indicative of IAN injury are identifiable on this radiograph,

but like other conventional radiographs, it is unable to give information in 3 dimensions. The advent of 3-dimensional imaging using cone beam computed tomography (CBCT) allows greater clarity of the relationship of the mandibular canal with the impacted or buried mandibular third molar. The use of CBCT has been shown to be helpful in experienced hands in avoiding encroaching on the IAN intraoperatively. The use of CBCT should be considered for patients who have positive signs of proximity of the 3M root to the mandibular canal (Bataneh, 2001)

IAN paresthesia is usually temporary, and the majority of cases recover within 6 months. The risk of permanent injury, in which sensory alteration lasts longer than 1 year, is less than 1%. In most cases, complete recovery of IAN sensory disturbance occurs 6–8 weeks after the trauma, although it may take up to 24 months.

Limitations of study include the inability to study certain parameters given the retrospective nature of this audit, loss of data due to dropouts from follow-up and the exclusion of patients who had not returned for postoperative follow-up.

Conclusion:

Paresthesia occurs widely from the age group of 18-30. Although these figures are relatively low, they are still of great significance for both patients and clinicians. Sometimes the injuries are unavoidable and may have legal disputes between doctors and patients. All patients must be warned of the risks of third molar surgery, including possible damage to the inferior alveolar nerve, buccal nerves and informed consent must be obtained before the procedure. The factors associated with a significantly higher incidence of paresthesia includes patients with mesioangular type of impaction. In order to reduce the neurological risks, alternative strategies might be used like coronectomy and orthodontic extraction techniques.

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