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Inferior Alveolar Nerve Injury Following Mandibular Third Molar Extraction: Literature Review

Review Article

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Abstract

Objectives: The study is to analyse the risk factors, prevalence of injury, recovery rate and different method of treatment.
Material And Method: The Data Bases of PubMed, Cochrane and Google scholar were searched for the related topics along with a complimentary manual search of all oral surgery journals till September 2020. All articles are included based on all RCTs.
Result: From the available data, After the removal mandibular third molar 1.20% developed transient IAN deficient and 0.28% developed permanent IAN deficient. The relation between mandibular canal, impacted tooth depth , surgical technique, intra operative nerve injury are statistically significant risk factors.The radiography finding helps the operator about surgical plan and reduce the incidence of complication.
Conclusion: The preoperative examination of the radiograph for the surgical plan will prevent the injury.The injury to inferior alveolar nerve after third molar extraction is 0.35 to 8.4%.The other factors like surgical techniques, surgeons experience also plays important role.The best advice for prevention of the inferior alveolar nerve injury is the prophylactic removal of 3rd molar before the root completely formed.

Introduction

Mandibular third molar extraction is the one of the dentoalveolar surgery. Third molar are present in 90% of the population with 33% people having impacted tooth.The non removal of the third molar leads to recurrent pericoronitis, periodontal defects, neurogenic and my facial pain, odontogenic cysts and tumor. In the adult it is reported that 11% to 84% chance of impacted tooth. The complication after removal of the tooth nerve injury ,which has reported incidence of 0.26% to 8.4%.the injury to nerve leads to the paresthesia of nerve.Its is reported that 1.20% is transient and 0.28% is permanent. The inferior alveolar nerve also damage by the rotary instrument while cutting the tooth. Damage to the nerve is also depends upon the depth and the type impaction.

The damage to inferior alveolar nerve factors including like personal, anatomical or radigraphical detail associated with the third molar.The purpose of the study was to review the literature data about the inferior alveolar nerve damage after the mandibular third molar extraction to find the risk factors, recovery rate and prevalences of injury.

Previously our team has a rich experience in working on various research projects across multiple disciplines (Govindaraju and Gurunathan 2017; A. Christabel et al. 2016; Soh and Narayanan 2013; Mehta et al. 2019; Ezhilarasan, Apoorva, and Ashok Vardhan 2019; Campeau et al. 2014; Kumar and S 2016; S. L. Christabel 2015; Kumar and Rahman 2017; Sridharan, Ramani, and Patankar 2017; Ramesh et al. 2016; Thamaraiselvan et al. 2015; Thangaraj et al. 2016; Ponnulakshmi et al. 2019; "Fluoride, Fluoridated Toothpaste Efficacy and Its Safety in Children - Review" 2018) Now the growing trend in this area motivated us to

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pursue this project.

Material And Method

Search strategy

A literature review was conducted for selected articles published from 1990 to 2020.The Data Bases of PubMed, Cochrane and Google scholar were searched for the related topics along with a complimentary manual search of all oral surgery journals till September 2020.

Inclusion Criteria

1.English language
2.Studies performed on humans who had no systemic diseases and immunological disorders.
3.mandibular third molar extraction articles.
4.Minimum follow up for 6 months postoperative.

Exclusion Criteria

1.Systemic diseases and immunological disorders.
2.patient follow up less than 6 months
3.Irrelevant articles related to third molar extraction.
4.Articles irrelevant according to the type of publication.

Data Extraction and Management

Two authors independently extracted the data using predefined form and any disagreement between the authors was resolved through discussions. Following data was extracted:

Author and year of study
Journal
Study design
Sample size and age group
Types of group
Outcome assessment
mean values and statistical significance.

Assessment of the Quality of Included Studies

The quality of the included studies was assessed using the guidelines given by the Cochrane Handbook of systematic review. The parameters used to evaluate the included studies are as follows:

- Random sequence generation (Selection bias)
- Allocation concealment (Selection bias)
- Blinding of participants and personnel (Performance bias)
- Blinding of outcome assessment (Detection bias)
- Free of Incomplete outcome data assessment (Attrition)

Table 1. Criteria for the assessment of risk of bias.

S.No	Criteria	Inference
1	Adequate random sequence generation	Yes : Random number table, computer random number generator, stratified or lock randomization, low tech- coin toss, shuffling cards, envelopes, throwing dice No: Quazi random- date of birth, day of visit, ID or record number, alternate allocation Non-random- choice of clinician or participant, availability Unclear
2	Allocation concealment	Yes: Central allocation, sequentially numbered, sealed, opaque envelopes, identical containers No: Random sequence known to staff in advance, envelope or packing without any safe guard, random predictable sequence Unclear
3	Blinding participants and personnel	Yes: Blinding and unlikely that blinding could have been broken, No blinding but outcome cannot be influenced No: No blinding, incomplete or broken blinding and outcome likely to be influenced Unclear
4	Blinding of outcome assessment	Yes: Blinding and unlikely that blinding could have been broken, No blinding but outcome cannot be influenced No: No blinding, incomplete or broken blinding and outcome likely to be influenced Unclear
5	Free of incomplete outcome data assessment (attrition, exclusion	Yes: No missing data. Reason for missing data not related to outcome and missing data balanced across the group No: Reason of missing data influencing the outcome Unclear
6	Free from baseline imbalance	Yes: Protocol is available and all the pre-specified outcome is reported. Protocol is not available but all the outcome of interest are reported No: Outcome are not reported as pre-specified or outcome are reported incompletely Unclear
7	Adequate reliability	Yes: Study free of any other source of bias No: Non-randomized studies, blocked randomization in unblinded trials. Unclear
	Risk of bias in the included studies	A) Low risk of bias (plausible bias unlikely to seriously alter the results) if all criteria were met. (B) Moderate risk of bias (plausible bias that raises some doubt about the results) if one or more criteria were partially met. (C) High risk of bias (plausible bias that seriously weakens confidence in the results) if one or more criteria were not met

- Free from baseline imbalance (Reporting bias)
- Adequate reliability

• Assessment of the Quality of Included Studies: Risk of bias assessment

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- Adequate reliability

Search result:

The literature search from the electronic databases of PubMed, Cochrane library, Google Scholar r. The bibliography of these full text articles was scanned to include studies apart from the electronic databases. No relevant studies were found from the cross-reference. A total of 4 studies met the inclusion and exclusion criteria of the intended research.The search strategy identified initially 125 relevant studies. After removal of duplicates and based on eligibility criteria,4 studies were identified for inclusion in systematic review.

Study:

Characteristics of the included studies were mentioned and the Outcome of these studies were assessed using clinical parameters The study done by Xu et al, 537 impacted third molar,mesioangular and vertical impaction based on winters classification.there is 33 patients with nerve injury, 23 patient healed within week and 10 healed within 6 months.

The study done by solve et al, 320 impacted lower third molar 11% have nerve injury.

The study was done by Thomas et al, 1377 impaction done, 62% have nerve injury in which horizontal impaction has higher postoperative sensory changes.

The study was done by king et al, 3270 impaction done, 23% have nerve injury in which horizontal impaction has higher postoperative complication.

Discusion

The literature review was designed to provide the knowledge regarding risk factors associated with injury to the inferior alveolar nerve after removal of impacted mandibular third molar.Injury to the inferior alveolar nerve is the major complication of removal of impacted third molar,Therefore precise preoperative imaging to conform the relation of third molar to the nerve.To decrease the nurological risks, there are different study done in which orthodontic tooth movement done but its is time consuming and the result of the treatment is favourable.In the other study they done coronectomy in which the apex close to the nerve left and the root fragment move away from the reverse after long time.

The other risk factors for nerve injury are surgeons experiences, the age and the sex of the patient. The depth of impaction also showed risk factor for nerve damage. According to the pell and Gregory the deeper the tooth the higher the chance of nerve injury. The surgical instruments had also influence on the incidence of nerve damage while sectioning the tooth. The experience the surgery is often most important factor for nerve damage.

The injury of the inferior alveolar nerve after 3rd molar impactions 0.35% to 8.4%. The knowledge of preoperatively may help to prevent injury and guide in the management of patient at high risk injury whiling removing impacted third molar.

Our institution is passionate about high quality evidence based research and has excelled in various fields (Jayaseelan Vijayashree Priyadharsini 2019; Pc, Marimuthu, and Devadoss 2018; Ramesh et al. 2018; Ramadurai et al. 2019; Sridharan et al. 2019; Ezhilarasan, Apoorva, and Ashok Vardhan 2019; Mathew et al. 2020; Samuel 2021; R et al. 2020; Chandrasekar et al. 2020; J. Vijayashree Priyadharsini, Smiline Girija, and Paramasivam 2018)

Conclusion

Radiographic findings, surgical technique, surgeons experience were high risk factors for nerve injury.There is another way to prevent the injury to nerve by prophylactic removal of the mandibular third molar before the roots completely formed.

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