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## Comparison of arch bar removal with and without the usage of local anaesthesia.

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P. DEEK SHEETHA<sup>1</sup>, BALAKRISHNA R N<sup>2\*</sup>, NASHRA KAREEM<sup>3</sup>

<sup>1</sup>Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai - 600077.

<sup>2</sup>Senior lecturer, Department of Oral and Maxillofacial surgery, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai - 600077.

<sup>3</sup>Senior Lecturer, Department of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai - 600077.

\*Corresponding Author

Email ID: 151401083.sdc@saveetha.com<sup>1</sup>, balakrishnarn.sdc@saveetha.com, nashrak.sdc@saveetha.com

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**Abstract:** The aim of this study is to assess the arch for removal With local anaesthesia versus arch bar removal without anaesthesia. Intermaxillary fixation is the most commonly used treatment modality In patients with maxillofacial trauma. On removal of the IMFs General anaesthesia and various forms of local anaesthesia and local anaesthetic techniques in the form of infiltrations, nerve blocks, topical local anaesthetic spray, topical local anaesthetic gel. This was a University-based study. The data was obtained by reviewing case sheets of patients from June 2019 to March 2020. The case sheets of the patients who had undergone intermaxillary fixation were appraised to assess if the arch bars were removed using local anaesthesia or without the usage of a local anaesthetic agent. 97% of the patients were given local anaesthesia for the removal of the arch bars. Lignocaine with adrenaline was the most commonly used (96%) local anaesthetic solution. 2ML of the local anaesthetic solution was the common amount of local anaesthetic solution used (35%)

**Keywords:** Arch bar removal; Innovation technique, Intermaxillary fixation; lignocaine; local anaesthesia.

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### INTRODUCTION

In India, road traffic accidents are one of the leading causes of death. According to the WHO-2018's report India has 1% of the world's vehicles, what accounts for 60% of the world's road traffic accidents. (Pal et al., 2019). In a developing country like India, due to the lack of proper traffic sense, maxillofacial trauma and fractures have become recurrent and frequent. (Chaurasia and Katheriya, 2018). Intermaxillary fixation is the most commonly employed method of treating maxillofacial trauma, As it causes reduction and immobilisation of the fracture site. (Stein and Titler, 2017) Maxillofacial trauma management transpires with indications of its own such as, after the fixation the patient must regain their normal occlusion status, facial symmetry and The temporomandibular joint must be capable of performing its normal complex movements. (SOREL and B, 1998). Management of maxillofacial trauma, when treated with intermaxillary fixation, involves "wiring the jaws shut", which can cause various hindrances for the anaesthetic management and for securing a patent airway, and in the management of an emergency should one arise. (Nalliah et al., 2013)

The most common age group of patients who had maxillofacial injuries and trauma were between the age folds of 30 to 40 years. of which mandibular fractures were more common than mid facial fractures. (Abhinav et al., 2019) According to the previous studies other than road traffic accidents, the causes of maxillofacial trauma and fractures were due to falls, assault, sports and industrial related accidents. (P. Kamalakannan, D. Durairaj, R. Karthikeyan, Ashish R. Jain. Comparison of bone plating methods for parasymphysis/body fractures of mandible. *Drug Intervention Today*. 2019;11(4):1006-12, no date). Among the mandibular fractures the mandibular condylar fractures are the most common of all 17.5-52%. Sub condylar fracture is the most common unilateral condylar fracture, while fracture of the condylar heads is the most common bilateral condylar fracture. The fracture of the mandibular condyles are more commonly caused by a direct trauma. But they can also occur due to an indirect force. (Balaji and Balaji, 2017). Oftentimes, post surgical complications can arise after the treatment of maxillofacial fractures with open reduction and internal fixation, which are more commonly seen in condylar fractures, the most common complications are infection which can lead to removal of the plate and paresthesia. (Ravikumar and Bhoj, 2019)

The time taken for the removal of eyelets and trans mucosal screws was comparatively lesser than the time taken for the removal of arch bars. (Sekar, Natarajan and Kapasi, 2017). In patients with pan facial fractures anaesthesia poses as a difficulty. In such cases a sub mental intubation along with a flexible bronchoscope can be carried out.

(Sridhar et al., 2014). Arch bar removals are commonly done either under general or local anaesthesia, so that the patients can remain comfortable and relatively pain free during the entire procedure. And patient cooperation can be ensured if anaesthetic agent is employed. But the patients experience pain during anaesthetic procedures, hence topical anaesthetics can be employed prior to arch bar removals or prior to local anaesthetic procedures itself. There are ample methods of anaesthetic means such as vibrotactile devices, accupal, Dental vibe and computer controlled anesthetic delivery systems (Sriram and Selvarasu, 2018), (Abhinav, Sweta and Ramesh, 2019) In patients with good pain threshold arch bar removals can be carried out with only a topical anaesthetic agent or without any anaesthetic agent, to save time. Various original studies have been carried out previously by our team, (Packiri, Gurunathan and Selvarasu, 2017), (Kumar, 2017b), (Jesudasan, Abdul Wahab and Muthu Sekhar, 2015; Kumar, 2017b), (Kumar and Rahman, 2017), (Christabel et al., 2016), (Marimuthu et al., 2018), (Patil et al., 2017), (Rao and Santhosh Kumar, 2018), (Kumar and Sneha, 2016), (Kumar, 2017c), (Kumar, 2017a), (Patturaja and Pradeep, 2016). The idea for this cross sectional study stemmed due the piqued interest in our community. Our department is passionate about research we have published numerous high quality articles in this domain over the past years (Abraham et al., 2005; Devaki, Sathivel and BalajiRaghavendran, 2009; Neelakantan et al., 2010, 2015; Arja et al., 2013; Ramshankar et al., 2014; Sumathi et al., 2014; Surapaneni and Jainu, 2014; Surapaneni, Priya and Mallika, 2014; Ramamoorthi, Nivedhitha and Divyanand, 2015; Manivannan et al., 2017; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; J et al., 2018; Ravindiran and Praveenkumar, 2018; Malli Sureshbabu et al., 2019; Mehta et al., 2019; Krishnaswamy et al., 2020; Samuel, Acharya and Rao, 2020; Sathish and Karthick, 2020) The main aim of this study is to assess the arch bar removal with local anaesthesia versus arch bar removal without local anaesthesia.

## MATERIALS AND METHODS

This study was done in a university based, cross sectional, uni-centred study. Ethical board clearance was obtained from the IERB Of Saveetha dental dental college and hospital, Chennai. IEC approval number: SDC/SIHEC/2020/DIASDATA/ 0619-0320. Informed consents were obtained from the patients.

**Sampling:** No sampling method was used as all the data samples obtained were included in this study. The date from which the data samples were collected was from June 2019 to March 2020. The case sheets of the patients assessed were those of the patients who had undergone intermaxillary fixation; cross verification of the obtained data was done by checking the intraoral photographs. In this study all samples of patients who had undergone intermaxillary fixation were included.

**Data collection:** The data was obtained by reviewing 86,000 patient case sheets, of patients of saveetha dental college and hospitals, chennai, of the patients who had undergone intermaxillary fixation were chosen for data collection. The parameters assessed were age, gender, type and amount of anaesthesia used for the arch bar removal. The data obtained was collected and tabulated in the excel sheets, which was transferred to the SPSS software by IBM version 25 for windows OS, for statistical analysis.

**Statistical analysis:** The software used for their statistical analysis was the SPSS software, by IBM - version 25 for Windows OS. The data obtained was imported from the Excel sheets to SPSS and variables were defined prior to statistical analysis. The independent variables were age and gender. While the dependent variables were the amount and type of LA used. The data was subjected to chi-square tests to find the correlation and association between the variables and any p value less than 0.05 was considered statistically significant.

## RESULTS AND DISCUSSION

The most common age group that underwent trauma was the 31-40 years age group, the incidence 42.86%. Males were more commonly affected than females. Males 85.71%, females 14.29%. 97.40% of the patients preferred arch bar removal with LA, while only 2.60% preferred arch bar removal without LA. In patients wherein LA was used 1ml (2.60%) was the least amount of LA used, while the largest amount of LA used was 10ml (1.3%), and the most common amount of LA used was 2ml (35.06%). In 96.10% of the patients lignocaine with adrenaline was used, while in only 1.30% of the patients lignocaine without adrenaline was used. LA was not used in only two age groups 1-10 years age group and 21-30 years age group. LA was not used in 2.60% of the males, while LA was used in all female patients for the removal of arch bars. In relation to the present study, local anaesthesia was commonly employed for the removal of the arch bars; rather than the removal of arch bars without local anaesthesia. The commonly used local anaesthetic agent was lignocaine with adrenaline. Males were more susceptible to maxillofacial trauma than females and the most common age group that underwent maxillofacial trauma was the 31-40 years of age. Mandible was more commonly fractured than the maxilla.

In the previous study by Kazuhiko Yamamoto et al, The removal of surgical plates was done using local anaesthesia on an outpatient basis. (Yamamoto et al., 2015) In the study by DG Coburn et al, the arch bars were removed under local Anaesthesia (Coburn, Kennedy and Hodder, 2002). In the study by NK Sahoo et al, the IMF

was removed with either local or general anaesthesia. (Sahoo et al., 2009) Jeong, Yeong Jin et al, Employed 2% lidocaine solution and topical Lidocaine gel prior to the removal of arch bars. (Jeong et al., 2016) In the previous study by Sahand Samieirad et al the most common age group that was susceptible to maxillofacial trauma was the 20-30 years of age group. (Samieirad et al., 2017) Which was similar to the results obtained by Zulfikhar et al, (Zulfikhar and Others, 2018) The both above mentioned studies were done in Iran and Pakistan respectively, and hence yielded different results than the present study. In the study by Mohanvalli Singaram et al, males were more commonly affected by maxillofacial trauma (Singaram, G and Udhayakumar, 2016) which was similar to the results obtained by C Prasad et al, (Prasad et al., 2018) The results obtained by the present study were similar to these two previous studies. In the study by T. Lloyd et al, on removal of IMFs local and general anaesthesia were both employed. In patients on whom local anaesthesia was used the patients felt uncomfortable, and this was eliminated by the use of general anaesthesia. (Lloyd, Nightingale and Edler, 2001) In the randomised control trial conducted by A.S Mc Millian et al, a combination of 2.5% of lidocaine and 2.5% of prilocaine was used as EMLA solution which provided better anaesthesia when compared with lignocaine alone (McMillan, Walshaw and Meechan, 2000). In the study by P.Pere et al, EMLA and placebos were employed for the removal of arch bars, and the patients who had undergone removal of arch bars using EMLA were significantly pain free than the ones who had undergone arch bar removal using a placebo. (Pere et al., 1992). The difference in the study results obtained can be attributed to the different regions and different study populations between the present and the previous studies.

The limitations of this study was that there was only a limited sample size, though all the samples were included in this study. The study population was based on the patients of a single university, and this study was single centred. The pain threshold of the patients were not assessed. In the future, further studies and research can be performed on a larger population, by including the patients from different universities within the state and country. Furthermore dose dependent anaesthetic studies and randomised control trials can be done using placebos versus other forms of anaesthetic agents. Research can be conducted by using newer forms of anaesthetic agents for the removal of arch bars.

## CONCLUSION

The aim of this study was to assess the removal of arch bars with anaesthesia versus without anaesthesia. Within the limits of this study it can be found that the patients preferred the removal of arch bars with a dose of local anaesthesia than without local anaesthesia. The main reason for it was a relatively comfortable and a pain free procedure.

## ACKNOWLEDGEMENT

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## AUTHOR CONTRIBUTIONS

Author 1 (P. Deeksheetha), carried out the study by collecting data and drafted the manuscript after performing the necessary statistical analysis. Author 2 (Dr.BalaKrishna R N) aided in conception of the topic, has participated in the study design, statistical analysis and has supervised in preparation of the manuscript. Author 3 (Dr. Nashra Kareem) has participated in the study design and has coordinated in developing the manuscript. All the authors have discussed the results among themselves and contributed to the final manuscript.

**Conflict of interest:** No conflict of interest

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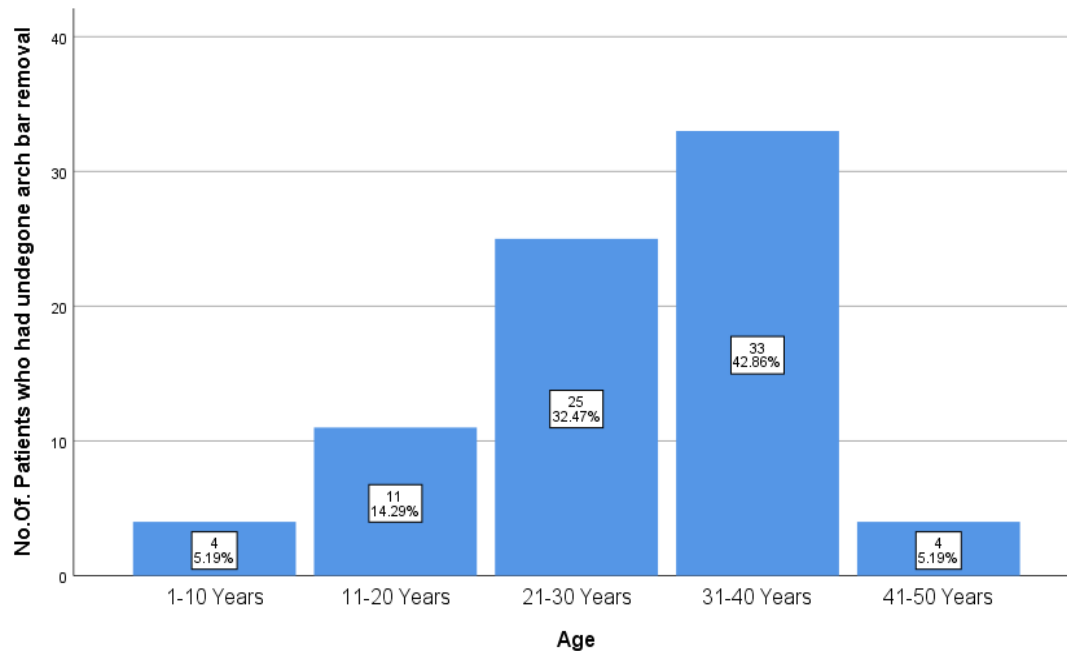
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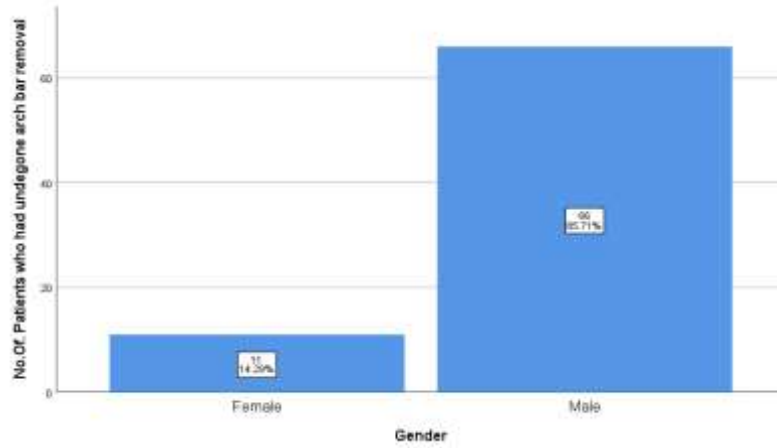
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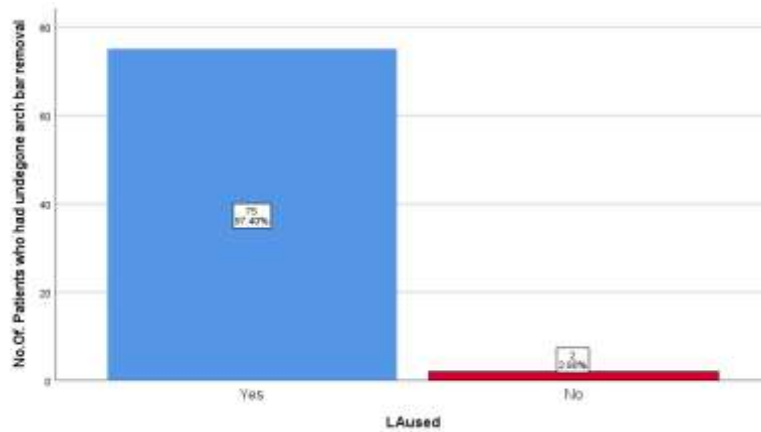
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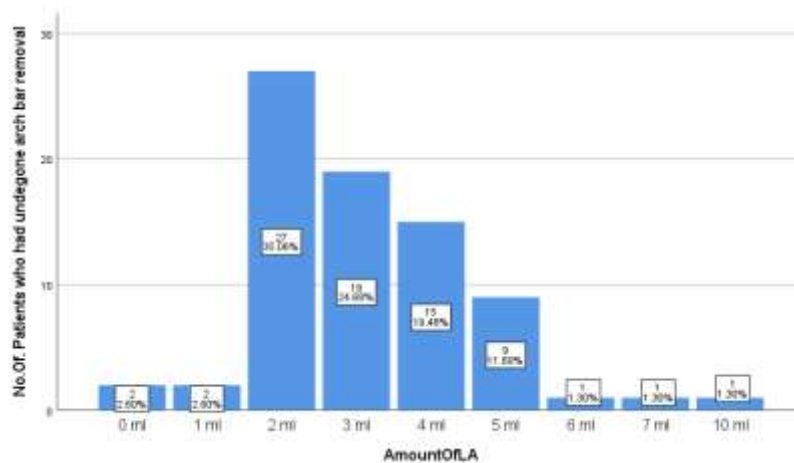
**Graph 1:** This bar graph shows the age distribution, among the study participants. The most common age group that underwent trauma was the 31-40 years age group (43%) followed by the 21-30 years age group (32.47%), followed by 11-20 years of age (14.29%). The least incidences of trauma was observed in the 1-10 years and 41-50 years age groups (5.19%) each.



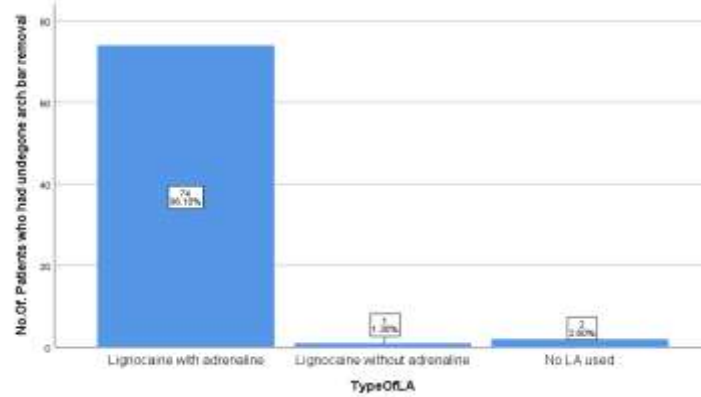
**Graph 2:** This bar graph represents the gender distribution among the study participants. Males were more commonly affected than females. Males 86%, females 14%.



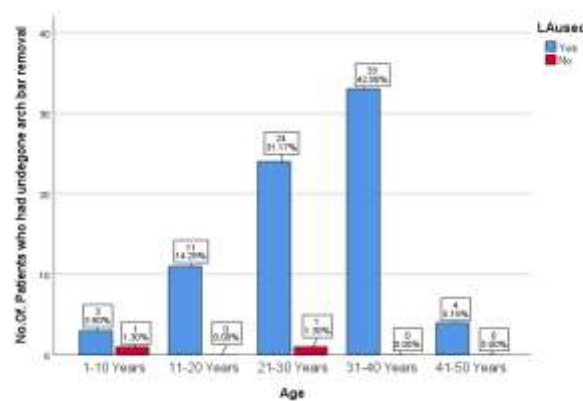
**Graph 3:** This bar graph shows the usage of LA for arch bar removal. 97.40% of the patients preferred arch bar removal with LA (blue colour), while only 2.60% preferred arch bar removal without LA (red colour).



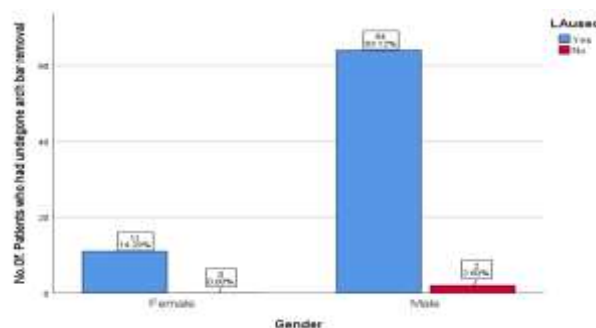
**Graph 4:** This graph shows the amount of LA used for arch bar removal. In patients wherein LA was used 1ml (2.5%), was the least amount of LA used, while the largest amount of LA used was 10ml (1.2%), and the most common amount of LA used was 2ml (35%).



**Graph 5:** This graph represents the type of LA used for arch bar removal. In 74 (96.10%) of the patients lignocaine with adrenaline was used, while in only 1 (1.30%) of the patients lignocaine without adrenaline was used.



**Graph 6:** This bar chart shows the comparison between different age groups and the LA used for arch bar removal. The X axis represents the age of the patient. The Y axis represents the number of patients who had undergone arch bar removal. Local anaesthesia was used more commonly for arch bar removal. Blue colour represents arch bar removal with local anaesthesia, while the red represents arch bar removal without local anaesthesia. Local anaesthesia was predominantly used in the 31-40 years age group than the other age groups. There was a significant difference in the LA usage for arch bar removal between the age groups. (Chi-square test, p value: 0.049 (p<0.05 statistically significant)).



**Graph 7:** This bar chart shows the comparison between gender of the patients and the usage of LA for the removal of arch bars. The X axis represents gender of the patient. The Y axis represents the number of patients who had undergone arch bar removal. Blue colour represents arch bar removal with local anaesthesia, while the red represents arch bar removal without local anaesthesia. In male and female patients local anaesthesia was more commonly used for arch bar removal. LA was employed for the removal of arch bars more commonly in males than females, however it was not statistically significant. (Chi-square test, p value: 0.559 (p>0.05 statistically not significant)).