

Retrospective Study on Effectiveness of Serratiopeptidase in Post Operative Pain, Swelling and Trismus Following Mandibular Third Molar Extraction

Research Article

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Abstract

The aim of this study was to assess the post operative pain, swelling and trismus following mandibular third molar extraction after serratiopeptidase. This study was conducted among 233 patients who had undergone surgical removal of mandibular third molar reported to a private dental hospital from June 2019 to March 2020. Data was collected and tabulated in excel. Data was analysed using SPSS Version 20. Out of which 218 were control group and 15 (6.8%) patients were given serratiopeptidase postoperatively. Out of 15 patients, 8 were females (53.3%) and 7 were males (46.7%). There was no statistically significant association between age, gender, tooth number and serratiopeptidase. Patients who received serratiopeptidase following mandibular impacted third molar removal, experienced with less postoperative pain, swelling and trismus compared with patients who didn't receive serratiopeptidase enzymes. We conclude from the present study that the serratiopeptidase enzymes decrease the pain, swelling and trismus following mandibular third molar extraction.

Keywords: Impacted Third Molar; Pain; Swelling; Trismus; Serratiopeptidase.

Introduction

Surgical removal of impacted third molar teeth in oral surgery has many postoperative complications such as pain, swelling and trismus [1]. Minimal trauma to adjacent soft tissues and proper wound closure minimizes pain, swelling and trismus [2]. These can be controlled by proper and adequate administration of local anaesthesia, mucoperiosteal flap reflection and its gentle handling, careful bone guttering and minimal trauma to adjacent soft tissues and appropriate wound healing technique [3]. Many papers that have suggested several measures to prevent and beat these complications [4]. Analgesics have been the main solution for alleviating pain in the past [5]. Hence assessment of postoperative Sequelae following the removal of an impacted third molar is used to evaluate the efficacy of analgesic [6].

A defense mechanism to cell injury is inflammation & when tissue damage occurs, large quantities of histamine, bradykinin, serotonin and other substances are released into the surround-

ing area. Histamine causes local vasodilation, thereby increasing blood flow to the damaged area [7]. The permeability of venous capillaries and venules is also increased. Glucocorticosteroids are the group of steroids that possess anti-inflammatory properties secreted by the adrenal cortex [8]. One of the most important actions of corticosteroids is the suppression of inflammation by interfering with capillary dilatation, edema formation, fibrin deposition, leukocytes migration and phagocytosis [9]. This inflammatory process is necessary for healing to occur, but often excessive inflammation causes the patient unnecessary pain, swelling and trismus [10].

Serratiopeptidase also known as serralysin, serratiopeptidase or serrapeptidase. It is widely used in the medical field as an inflammatory and analgesic [6]. Certain reports which also suggest antisclerotic, fibrinolytic and caseinolytic properties of serratiopeptidase [11]. It has high enzyme activity, including a potent anti-inflammatory action, anti-swelling as well as bradykinin-decomposing activity and it also enhances the antibiotic action at the site of the lesion [12]. In the field of dentistry, serratiopeptidase is be-

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Received: October 10, 2019**Accepted:** November 27, 2019**Published:** December 03, 2019

Citation: Karthiga Devi G, Pradeep D. Retrospective Study on Effectiveness of Serratiopeptidase in Post Operative Pain, Swelling and Trismus Following Mandibular Third Molar Extraction. *Int J Dentistry Oral Sci.* 2020;S11:02:001:1-7. doi: <http://dx.doi.org/10.19070/2377-8075-SI02-011001>

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ing considered for post operative reduction of pain, swelling after minor surgical procedure [13]. The most common surgical procedure in dentistry is the minor surgical removal of impacted teeth. Hence serratiopeptidase which is suggested by various authors for the anti-inflammatory effects after third molar removal [14].

The aim of the study was to evaluate the post operative pain, swelling and trismus after serratiopeptidase enzymes.

Methods and Materials

Study Setting

This present study is conducted as a retrospective cross sectional study with consecutive non probability sampling among the patients visiting a Private Dental Hospital, Chennai, Tamil Nadu. The study setting is a University setting. The present study was approved by the Institutional Ethical Committee (SDC/SIHEC/2020/DIASDATA/0619-0320). The study done in the time period of June 2019 to March 2020. The study sample included both male and female genders but were mostly south Indian population due to geographic limitations.

Data Collection

The data collected from the patients were demographic data (Age, Sex, Marital Status, Occupation, Address etc.). The total number of patient's case sheets reviewed in the present study was 86000 case sheets. The inclusion criteria for the study was patients who had Pericoronitis or deep caries with pulpitis or for orthodontics reasons and having bilateral mandibular third molar and also case sheets which were completely filled. The exclusion criteria for the study was patients who had a history of systemic illness (Eg: Syndromes, Diabetes Mellitus, Hypertension) and case sheets which do not have complete details were excluded from the study. Sampling bias was done to minimize by simple random sampling. Any gross data which had the possibility of bias and could affect the studies was not included. All the data collected was cross verified by photographic and radiographic examination by additional reviewers.

Data Analytics

Data was entered into a spreadsheet using Excel version 16.37 (Microsoft Corp, Redmond, Wash). The data tabulation in excel was according to S.no, PID, Age, Gender, Tooth number, Pain,

Swelling and Trismus. The data which was collected was analyzed using Statistical Package for Social sciences (SPSS) software, version 2064 (IBM corp., NY, USA). The data was assessed by being subjected to descriptive analysis with the help of frequencies, percentages. Non parametric chi square test was used and results were correlated and associated.

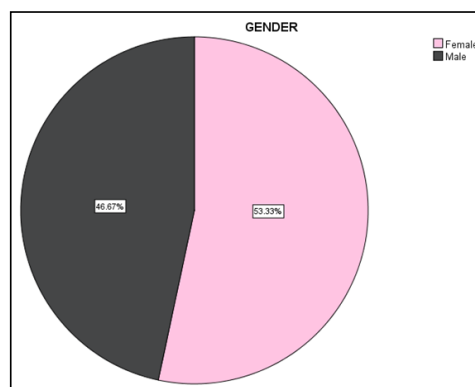
Results and Discussion

The present study was aimed at evaluating the efficacy of serratiopeptidase in reducing postoperative pain, swelling, and trismus after removal of the mandibular third molar.

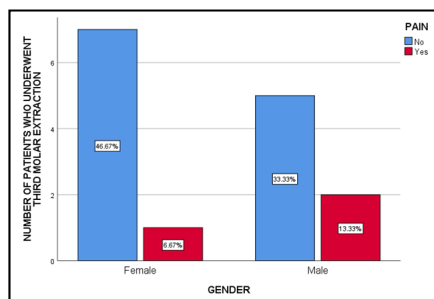
A total of 233 patients were included in this study of which 218 were control group and 15 patients were given serratiopeptidase postoperatively. Out of 15 patients, 8 were females (53.3%) and 7 were males (46.7%) [Graph 1]. The Male patients (13.33%) had experienced higher prevalence of postoperative pain compared to female patients (6.67%). Chi square test was performed and association between Gender and Postoperative Pain after serratiopeptidase was found to be statistically not significant (P Value = 0.438) [Graph 2]. The Male and female patients (6.67%) had experienced postoperative swelling. Chi square test was performed and association between Gender and Postoperative Swelling after serratiopeptidase was found to be statistically not significant (P Value = 0.919) [Graph 3]. The female patients (6.67%) had experienced higher prevalence of postoperative trismus compared to male patients. Chi square test was performed and association between Gender and Postoperative trismus after serratiopeptidase was found to be statistically not significant (P Value = 0.333) [Graph 4]. The age group of 15-20 years of age (13.33%) had experienced higher prevalence of postoperative pain followed by 20-30 years of age (6.67%). Chi square test was performed and association between Age and Postoperative pain after serratiopeptidase was found to be statistically not significant. (P Value = 0.350) [Graph 5].

The age group of 15-20 and 20-30 years of age (6.67%) had experienced higher prevalence of postoperative swelling. Chi square test was performed and association between Age and Postoperative swelling after serratiopeptidase was found to be statistically not significant (P Value = 0.816) [Graph 6]. The age group of 15-20 years of age (6.67%) had experienced higher prevalence of postoperative trismus. Chi square test was performed and association between Age and Postoperative trismus after serratiopeptidase was found to be statistically not significant (P Value = 0.400)

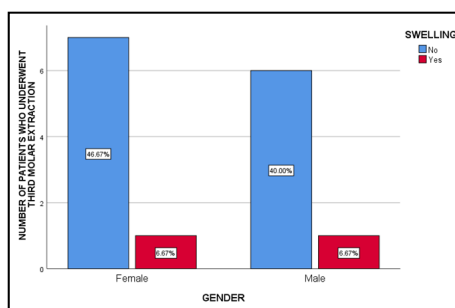
Graph 1. Pie chart showing distribution of Gender of the patient. Black color represents the Male patients and Pink color represents the Female patients. Male (53.33%) and Females (46.67%) among the study population.



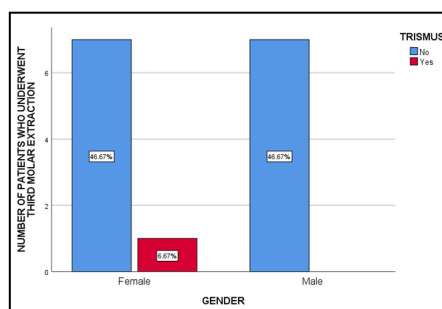
Graph 2. Bar chart showing association between Gender and Postoperative Pain after serratiopeptidase. X axis represents the distribution of patients according to Gender. Y axis represents the number of patients who have undergone mandibular third molar extraction. The Male patients (13.33%) had experienced higher prevalence of postoperative pain compared to female patients (6.67%). Chi square test was performed and association between Gender and Postoperative Pain after serratiopeptidase was found to be statistically not significant. Pearson Chi square Value = 0.438 (P>0.05), hence statistically not significant.



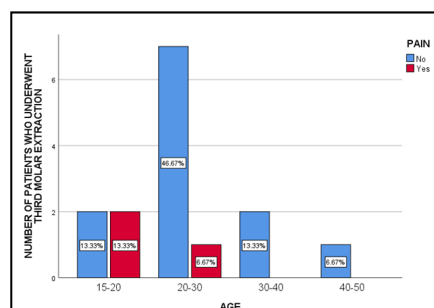
Graph 3. Bar chart showing association between Gender and Postoperative Swelling after serratiopeptidase. X axis represents the distribution of patients according to Gender. Y axis represents the number of patients who have undergone mandibular third molar extraction. The Male and female patients (6.67%) had experienced postoperative swelling. Chi square test was performed and association between Gender and Postoperative Swelling after serratiopeptidase was found to be statistically not significant. Pearson Chi square Value = 0.919 (P>0.05), hence statistically not significant.



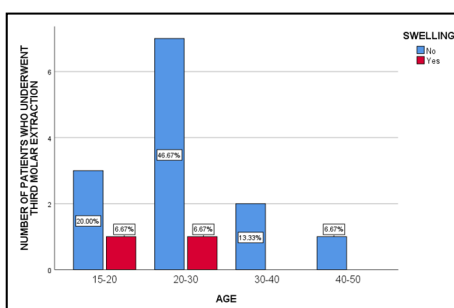
Graph 4. Bar chart showing association between Gender and Postoperative Trismus after serratiopeptidase. X axis represents the distribution of patients according to Gender. Y axis represents the number of patients who have undergone mandibular third molar extraction. The female patients (6.67%) had experienced higher prevalence of postoperative trismus compared to male patients. Chi square test was performed and association between Gender and Postoperative trismus after serratiopeptidase was found to be statistically not significant. Pearson Chi square Value = 0.333 (P>0.05), hence statistically not significant.



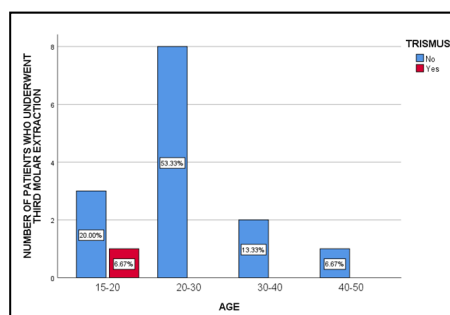
Graph 5. Bar chart showing association between Age and Postoperative pain after serratiopeptidase. X axis represents the distribution of patients according to age groups. Y axis represents the number of patients who have undergone mandibular third molar extraction. The age group of 15-20 years of age (13.33%) had experienced higher prevalence of postoperative pain followed by 20-30 years of age (6.67%). Chi square test was performed and association between Age and Postoperative pain after serratiopeptidase was found to be statistically not significant. Pearson Chi square Value = 0.350 (P>0.005), hence statistically not significant.



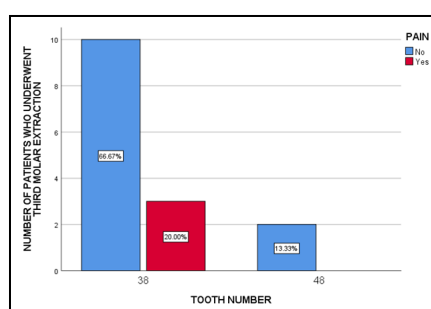
Graph 6. Bar chart showing association between Age and Postoperative swelling after serratiopeptidase. X axis represents the distribution of patients according to age groups. Y axis represents the number of patients who have undergone mandibular third molar extraction. The age group of 15-20 and 20-30 years of age (6.67%) had experienced higher prevalence of postoperative swelling. Chi square test was performed and association between Age and Postoperative swelling after serratiopeptidase was found to be statistically not significant. Pearson Chi square Value = 0.816 (P>0.005), hence statistically not significant.



Graph 7. Bar chart showing association between Age and Postoperative Trismus after serratiopeptidase. X axis represents the distribution of patients according to age groups. Y axis represents the number of patients who have undergone mandibular third molar extraction.. The age group of 15-20 years of age (6.67%) had experienced higher prevalence of postoperative trismus. Chi square test was performed and association between Age and Postoperative trismus after serratiopeptidase was found to be statistically not significant. Pearson Chi square Value = 0.400 (P>0.005), hence statistically not significant.



Graph 8. Bar chart showing association between Tooth number and Postoperative Pain after serratiopeptidase. X axis represents the distribution of patients according to Tooth number (38,48). Y axis represents the number of patients who have undergone mandibular third molar extraction. The Tooth number 38 (20.00%) had experienced higher prevalence of postoperative pain. Chi square test was performed and association between Tooth number and Postoperative Pain after serratiopeptidase was found to be statistically not significant. Pearson Chi square Value = 0.448 (P>0.05), hence statistically not significant.

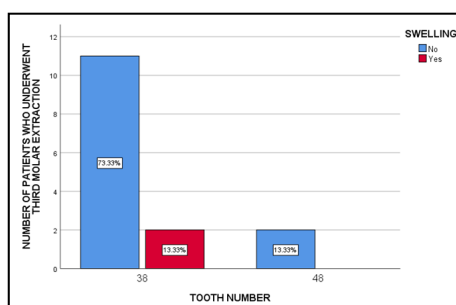


[Graph 7]. The Tooth number 38 (20.00%) had experienced higher prevalence of postoperative pain. Chi square test was performed and association between Tooth number and Postoperative Pain after serratiopeptidase was found to be statistically not significant (P Value = 0.448) [Graph 8]. The Tooth number 38 (13.33%) had experienced higher prevalence of postoperative swelling. Chi square test was performed and association between Tooth number and Postoperative swelling after serratiopeptidase was found to be statistically not significant (P Value = 0.551) [Graph 9]. The Tooth number 38 (20.00%) had experienced higher prevalence of postoperative trismus. Chi square test was performed and association between Tooth number and Postoperative Trismus after

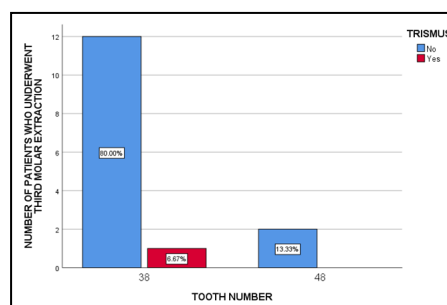
serratiopeptidase was found to be statistically not significant (P Value = 0.685) [Graph 10].

Dental extractions are the commonly performed procedures in dental clinics [15]. An ideal tooth extraction is defined as painless removal of the whole tooth or tooth root with minimal trauma to the investing tissues so that the wound heals uneventfully and no postoperative prosthetic problem is created [16]. Since surgical dental procedures are common and risk for cardiac diseases is on the rise, use of antibiotic prophylaxis before the start of the treatment in susceptible patients is highly recommended [17]. The surgical removal of an impacted third molar tooth can result in

Graph 9. Bar chart showing association between Tooth number and Postoperative Swelling after serratiopeptidase. X axis represents the distribution of patients according to Tooth number (38,48). Y axis represents the number of patients who have undergone mandibular third molar extraction. The Tooth number 38 (13.33%) had experienced higher prevalence of postoperative swelling. Chi square test was performed and association between Tooth number and Postoperative swelling after serratiopeptidase was found to be statistically not significant. Pearson Chi square Value = 0.551 ($P>0.05$), hence statistically not significant.



Graph 10. Bar chart showing association between Tooth number and Postoperative Trismus after serratiopeptidase. X axis represents the distribution of patients according to Tooth number (38,48). Y axis represents the number of patients who have undergone mandibular third molar extraction. The Tooth number 38 (20.00%) had experienced higher prevalence of postoperative trismus. Chi square test was performed and association between Tooth number and Postoperative Trismus after serratiopeptidase was found to be statistically not significant. Pearson Chi square Value = 0.685 ($P>0.05$), hence statistically not significant.



considerable pain, swelling and limited mouth opening. Swelling usually reaches its maximum within 48-72 hours of the surgical procedure. Minimizing tissue damage can control the amount of post surgical edema [18]. Some studies suggested ice can decrease vascularity and thereby diminishes transduction. However, no controlled study has verified this practice. The vasoactive amines cause vasodilation, thereby increasing blood flow to the inflamed area [19]. The inflammatory process is necessary if healing is to occur but inflammation can also cause edema, pain and trismus [20]. The intensity of the inflammatory process may be reduced by administering corticosteroids [21].

Enzymes are considered as extremely potent substances and their therapeutic application is attractive [17]. Serratiopeptidase is a proteolytic enzyme produced enzyme activity, including a potent anti-inflammatory action, anti-swelling as well as bradykinin decomposing activity and it also enhances the antibiotic action at the site of lesion [22]. Serratiopeptidase is a proteolytic enzyme which is being used alone or in combination with steroids and NSAIDs for effective relief from pain and swelling. It is usually administered orally, absorbed through the intestine and directly transported into the bloodstream [8]. However due to its peptide nature, there is a greater tendency to undergo enzymatic degradation in the gastrointestinal tract, leading to poor bioavailability. Enteric coated formulations are available in the market to overcome poor bioavailability. In dental practice minor surgical procedures often are associated with post-operative pain and swelling which is annoying to the patient [10]. Eugenol-based paste applied to the

alveolar socket once after extraction [2]. Serratiopeptidase was found very effective in the management of various facial pain conditions such as tension headache, migraine, myofascial pain, trigeminal neuralgia and in post-operative wound pain including TMJ surgery, blowout fracture repair and reconstructive facial surgery [19-23].

In particular, it is more often a source of great discomfort after surgical removal of an impacted molar tooth. Serratiopeptidase is being used by dentists to combat post-operative pain, swelling and trismus associated with surgical removal of impacted molar. Dental pain is largely inflammatory, and evidence based medicine has shown that non-steroidal anti-inflammatory drugs (NSAIDs) are the best analgesics for dental pain [24]. The anti-inflammatory activity is attributed to an increase in the viscosity of accumulated fluid facilitating drainage. It can modify cell-surface adhesion molecules that attract inflammatory cells to their target site. Non-steroidal anti-inflammatory drugs (NSAIDs) have been used for more than 25 years to treat Rheumatological diseases [25]. They were then introduced to relieve pain after tooth extraction and to provide postoperative analgesia. When used alone, they are effective in relieving mild to moderate pain such as that seen after maxillofacial, minor orthopaedic or some ambulatory surgical procedures and postpartum pain [26, 27]. NSAIDs have additional anti-inflammatory activity that is lacking in Opioids, which plays an important role in relieving post-operative pain and inflammation [29]. The analgesic activity is related to the inhibition of pain inducing bradykinin and other amines [28]. As regards

to the safety of use, there has not been any published reports on adverse drug reactions to serratiopeptidase [30].

Results of this study showed that among 15 patients. Only 3 patients (2 male, 1 female) experienced postoperative pain (Graph 1). These results are in line with the results in a study conducted by Al-khateeb and Nusair investigated the ability of serratiopeptidase to reduce post operative pain, swelling and trismus after third molar surgery [29]. Only 1.3% of patients experienced post operative swelling after serratiopeptidase (Graph 2). Among 15 patients, 1 participants experienced postoperative trismus (Graph 3).

According to Age wise distribution, the 2nd decade of life experienced postoperative pain, swelling and trismus (Graph 4,5,6). The results are in line with the results in a study conducted by sisk et al, evaluated serratiopeptidase for the inhibition of the postoperative response [30]. According to Tooth number wise distribution (38,48) in which patients who underwent extraction of 38 experienced postoperative pain, swelling and trismus compared to 48 (Graph 7,8,9). The results are not in line with the results in a study conducted by Ehsan et al., which is statistically significant [31]. In our study, there were no significant differences on Pain, swelling and trismus after lower third molar extraction among tooth number, age and gender.

Acknowledgements and Declarations

The authors thank Saveetha Dental College for constant support in providing the data for analysis.

Conclusion

We conclude from the present study that the serratiopeptidase decreases the pain, swelling and trismus following mandibular third molar extraction. Male patients (13.33%) had experienced higher prevalence of postoperative pain. The Male and female patients (6.67%) had experienced postoperative swelling. The female patients (6.67%) had experienced higher prevalence of postoperative trismus. There was no statistically significant association between age, gender, tooth number and serratiopeptidase. As serratiopeptidase has a better safety profile than the other counterparts such as Nonsteroidal anti-inflammatory agents and corticosteroid, it can be considered as an alternative drug in case of intolerance or contra-indication to other drugs.

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