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Evaluation of Complications Following Impacted Mandibular Third Molar Extraction in Patients with Different Hand Preference

Farklı El Tercihi Olan Hastalarda Mandibular Gömülü Üçüncü Molar Çekim Sonrası Oluşan Komplikasyonların Değerlendirilmesi

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Abstract

Objective: Individual preference of using right or left hand for doing various hand workings, is the most easily observable form of the cerebral lateralization. It was stated that, among the right or left hand dominant individuals, there is an immunological asymetry, and a difference in motor control, visuospatial skills, and in the incidence of a number of disease. The aim of the study was to investigate pain, edema, trismus following the mandibular third molar extraction in patients with different hand preference.

Materials and Methods: Forty-three patients who were indicated for bilateral surgical extraction of impacted mandibular third molars were included in the study. The interval between the extraction of the right and left molars of the patient was 30 days. The patients were divided into four groups; 1) left handed-right (right third molar), 2) left handed-left, 3) right handed-right, and 4) right handed-left. Measurements were made for comparison of pain, edema and trismus before and after operation.

Results: The statistical significance was not observed between the groups regarding the pain, edema and trismus ($p>0.05$).

Conclusion: The results suggest that severity of pain, edema and trismus may not be related to the hand preference following the right and left mandibular third molar extraction. Extended studies demonstrating an extent of an influence of hand preference in the complications of oral surgery, could be useful for planning the surgical interventions as well as for treatment results in maxillofacial surgery.

Öz

Amaç: Bireyin çeşitli el işlerini yapmak için sağ veya sol elini tercih etmesi serebral lateralizasyonun en kolay gözlenebilen şeklidir. Sağ veya sol eli dominant olan kişiler arasında motor kontrol, vizyospasyal görevleri yerine getirmede, çeşitli hastalıkların görülme insidansında farklılıklar ve immün asimetri olduğu söylenmiştir. Bu çalışmada, mandibular 3. molar çekimini takiben görülen ağrı, ödem, trismusun el tercihi farklı olan hastalarda değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntemler: Çalışmaya, sağ ve sol mandibular gömülü 3. molar dişlerin çekiminin gerekli olduğu 43 hasta dahil edildi. Aynı hastadan sağ ve sol mandibular gömülü diş çekimi 30 gün arayla yapıldı. Dört hasta grubu oluşturuldu: 1) el tercihi sol-sağ (sağ mandibular 3. molar dişi çekilen), 2) el tercihi sol-sol, 3) el tercihi sağ-sağ, 4) el tercihi sağ-sol. Ağrı, ödem ve trismusun operasyondan önce ve sonra karşılaştırılması için ölçümler yapıldı.
Bulgular: Gruplar arasında ağrı, ödem, trismus açısından istatistiksel bir fark görülmedi (p>0,05).
Sonuç: Sonuçlar, sağ ve sol mandibular üçüncü molar ekstraksiyonu sonrası ağrı, ödem ve trismus şiddetinin el tercihi ile ilişkili olmayabileceğini düşündürmektedir. Fonksiyonel serebral lateralizasyon olan el tercihinin oral cerrahi komplikasyonlarında ne kadar etkin olduğunu ortaya çıkaracak daha kapsamlı araştırmaların gerek maksillofasiyal cerrahi girişimlerinin planlanmasında gerekse tedavi sonuçlarında faydalı olabileceği kanaatine varılmıştır.

Introduction

Extraction of impacted mandibular third molars is among the commonly performed procedures in oral surgery. Complications such as pain, edema, and trismus may occur after extraction. The severity of these complications depends on how embedded the extracted tooth is, its anatomical position, its adjacencies, and gum inflammation, in addition to the patient's systemic diseases, pre-and postoperative oral hygiene, and immune resistance (1-5).

Hand preference is defined as choosing the right or left hand to perform various manual tasks such as writing and using a fork and knife. Cerebral lateralization is the anatomical and functional differentiation between the right and left hemispheres of the brain. The right and left hemispheres have separate functions, and the dominant hemisphere performs these functions better than the other (6-9). There is a direct relationship between hand preference and right- or left-hemisphere dominance. Hand preference is functional cerebral lateralization and is the most easily observed manifestation of cerebral lateralization (8,9). Studies have revealed differences in motor control, performance of visuospatial tasks, and the incidence of various diseases between right-handed and left-handed individuals (10-12).

Several studies have evaluated the complications that occur following impacted mandibular third molar extraction in different patient groups (13,14). In this study, complications of impacted mandibular third molar extraction, such as pain, edema, and trismus, were compared in patients with different hand preferences.

Materials and Methods

A total of 43 patients between 17 and 43 years old with a mean age of 21.6 years were included in the study. The group comprised 11 (25.5%) males and 32 (74.4%) females. All patients included in the study required extraction of both left and right mandibular third molars [class 2, position B, vertically impacted according to the Pell and Gregory Classification System (15)] with bone removal. Patients who were pregnant or had systemic disease, smoking habit, allergy to any of the drugs to be used postoperatively, history of antibiotic or analgesic use in the last month, or infection, acute pericoronitis, and severe periodontal disease at the operation site were not included.

All patients were informed about the surgical procedure and possible complications. The study protocol was reviewed and approved by the Recep Tayyip Erdoğan University Faculty of Medicine Clinical Research Ethics Committee (meeting date: 23.10.2015, decree no: 37). Panoramic radiographies of all patients were obtained preoperatively. Each patient's name, age, gender, and the classification of impacted teeth were recorded in a patient follow-up form. Patients provided informed consent by signing a volunteer consent form which including brief information about the study.

The procedures were performed under mandibular and buccal local anesthesia. Following an L-type incision, a full-thickness flap was lifted. The bone tissue around the tooth was removed under flow of a physiological saline solution. Also, after extraction of the tooth, the cavity was irrigated with physiological saline solution. The wound was closed with a primary 3-0 silk suture. All the extractions were done by the same surgeon. Forty-three patients with different hand preferences whose impacted mandibular right and left third molars needed to be extracted were included in the study. Eleven of the patients were left-handed and 32 were right-handed. For data analysis, 4 groups were created: 1) Left hand preference-right extraction (n=11); 2) Left hand preference-left extraction (n=11); 3) Right hand preference-right

extraction (n=32); 4) Right hand preference-left extraction (n=32). For all patients, there was a 30-day interval between extractions of the right and left impacted mandibular third molars, and a total of 86 teeth were extracted.

An antibiotic (amoxicillin 500 mg twice daily), analgesic (paracetamol 500 mg 3 times daily), and mouthwash (2% chlorhexidine gluconate 3 times daily) were prescribed postoperatively. Patients were advised by a physician postoperatively to not eat or drink for 2 hours after surgery, to avoid hot food and drinks within the first 24 hours, to not chew with the area involved in the operation, to eat soft and warm foods, to brush normally in the unoperated areas, to avoid touching the teeth, stitches, and gums in the surgery area while brushing, to use the prescribed mouthwash twice a day, after brushing their teeth in the morning and evening, and to not eat or drink anything for 1 hour after using the mouthwash. For all patients, sutures were removed on the 7th postoperative day.

Collection of Data Before and After Extraction

The visual analogue scale (VAS) was used to assess pain in the study. VAS scores (0-10 points) were evaluated at postoperative 2, 6, and 12 hours and 2, 4, and 7 days.

We modified the method described by Schultze-Mosgau et al. (16) to assess edema in the jaw and the face: 6 fixed points and 5 surgical baselines were marked on the patient's face while the mouth was closed, and the distances between the points were measured using a string. Measurements were made immediately before surgery and at 2nd and 7th days postoperatively. The sum of all measurements was taken as face size. The amount of edema at 2nd and 7th days was calculated for each patient by subtracting the preoperative face size (sum of preoperative facial measurements) from the postoperative face size (sums of facial measurements taken at postoperative 2 and 7 days, respectively).

To evaluate trismus, the distance between the lower and upper right central teeth were measured using a millimetric ruler before the surgery and at 2nd and 7th days after surgery. The difference between preoperative and postoperative measurements was recorded as the amount of trismus on the given day.

Hand preference was determined using the Edinburgh Handedness Inventory (8). Those with handedness scores lower than zero were considered as left-handed and those with scores higher than zero were considered right-handed.

Statistical Analysis

The Mann-Whitney U and Wilcoxon tests were used for statistical analysis of the data. P value of less than 0.05 was considered statistically significant.

Results

According to VAS scores, all patients had similar high levels of pain at 2 hours, 6 hours, and 2 days after extraction. VAS scores decreased at 4 days and were lowest on day 7. There was no statistically significant difference between groups in terms of postoperative VAS values ($p>0.05$).

There was no statistically significant difference ($p>0.05$) between groups when postoperative 2 and 7 day edema and trismus values were compared.

Discussion

Pain, edema, and trismus after the extraction of impacted third molars are expected outcomes and these complications adversely affect the daily life of patients (17-19). Many studies have suggested that corticosteroids, different anesthetics, pain killers, and anti-inflammatory drugs may reduce the severity of these complications (20,21). It has been claimed that post-extraction pain reaches maximum intensity within 2-4 hours or, according to some studies, within 12 hours, and that the pain level decreases on postoperative day 6 (17-21). We did not find any studies on oral surgery in patients with different hand preferences in the literature. In our study, we found that pain was high in all groups at 2 hours, 6 hours, and 2 days after extraction, decreased on day 4, and reached its lowest level on day 7. There was no statistically significant difference between the groups in terms of VAS scores ($p>0.05$). Furthermore, there was no statistical difference in the VAS values after impacted right and left mandibular third molar tooth extraction, regardless of hand preference. In their study on cerebral lateralization, Pauli et al. (22) stated that right hemisphere hyperactivity causes increased pain sensitivity and that pain sensitivity may vary according to hemisphere dominance. The level of pain after the removal of an impacted tooth may vary from patient to patient. Therefore,

we conducted our study in patients undergoing extraction of symmetrical impacted third molars with similar difficulty level to allow the comparison of postoperative pain on both sides in the same patients. Our study group also included patients with different hand preference. As hand preference known to be a functional cerebral lateralization, we concluded that cerebral lateralization does not create a difference in terms of pain intensity after impacted mandibular third molar extraction.

Pain is one of the most important causes of trismus after mandibular third molar extraction. Other causes of trismus include postoperative edema, inflammation, hematoma, muscle and tendon trauma, and psychological components (19-21). Trismus reaches its maximum level 2 days after extraction and may last for 7-10 days (21). It has been claimed that the duration and severity of this complication varies from patient to patient (17-21). In our study, there was no statistically significant difference between groups when the levels of trismus at postoperative 2 and 7 days were compared. We observed that trismus was severe on day 2 in all groups and decreased on day 7, consistent with the results of other studies in the literature (17-21) Similarly, no statistically significant difference was found between groups in edema at postoperative 2 and 7 days.

Severe trismus can cause secondary infection by making the maintenance of oral hygiene difficult after extraction, thus increasing the development of postoperative complications (23). Moreover, poor oral hygiene after extraction can also increase the severity of trismus. The superiority of right- or left-handed patients in maintaining oral hygiene is a subject of debate. In a study of patients with different hand preferences, it was reported that right-handed patients practiced better oral hygiene and had a lower incidence of decay compared to left-handed patients (24). There are also studies that state the opposite (25-27). Herrmann and van Dyke (28) found that left-handed subjects were faster than the right-handed subjects in evaluating the same or different sensory patterns presented in various orientations. Studies have focused on the possibility that patient motivation, manual dexterity, and tooth brushing efficiency may differ in right-handed and left-handed individuals and, therefore, have lead to differing conclusions regarding whether postoperative inflammation and the maintenance of oral hygiene are associated with handedness (29).

There are also studies in the literature showing that there is a relationship between hand preference and various diseases. Type 2 diabetes and autoimmune and inflammatory diseases are some of the diseases whose incidence differs between right- and left-handed individuals (30,31). Some studies have reported that the immune system is stronger on the left side of the body and in left-handed people (32-34). There is a direct relationship between the immune system and inflammation. The mediators released during inflammation target immune and inflammatory cells (35). The severity of complications such as pain, edema, and trismus after extraction is affected by the severity of inflammation at the site of extraction (19-21). Severe inflammation may increase the development of complications after extraction (19-21). In our study, there was no statistical difference in the pain, edema, and trismus values after extraction between the right-handed groups 3 and 4 and the left-handed groups 1 and 2, suggesting that there was also no difference in inflammation in the extraction areas. Recent studies have focused on whether the number, size, and ultrastructural features of lymph nodes on the left and right sides of the body are different in individuals with different hand preferences (36-38).

One study stated that cerebral lateralization influences facial structure, with the right craniofacial region being larger than the left in right-handed people, and the left craniofacial region being larger than the right in left-handed people (39). The authors of another study emphasized that facial asymmetry was less pronounced in left-handed individuals compared to right-handed individuals (40). Research is also being conducted on whether this asymmetry influences chewing strength and whether there is a right or left chewing side preference in individuals with different hand preferences (41).

Conclusion

Our results show that the severity of complications such as pain, edema, and trismus that occur after mandibular third molar extraction may not be related to hand preference. There was no statistically significant difference in pain, edema, and trismus severity after impacted mandibular right and left third molar extraction between patients with different hand

preferences. More extensive research elucidating the impact of hand preference, which is a functional measure of cerebral lateralization, on oral surgery complications may be beneficial both in the planning of maxillofacial surgical interventions and in achieving favorable treatment outcomes.

Ethics

Ethics Committee Approval: The study protocol was reviewed and approved by the Recep Tayyip Erdoğan University Faculty of Medicine, Clinical Research Ethics Committee (meeting date: 23.10.2015, decree no. 37).

Informed Consent: Informed consent was obtained from all patients.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: U.K.A., Concept: U.K.A., Design: U.K.A., Data Collection or Processing: U.K.A., N.K., Analysis or Interpretation: U.K.A., Literature Search: U.K.A., N.K., Writing: U.K.A.

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References

1. Al-Moraissi EA, Elmansi YA, Al-Sharaee YA, Alrmali AE, Alkhutari AS. Does the piezoelectric surgical technique produce fewer postoperative sequelae after lower third molar surgery than conventional rotary instruments? A systematic review and meta analysis. Int J Oral Maxillofac Surg 2016; 45: 383-91.
2. Arteagoitia MI, Barbier L, Santamaría J, Santamaría G, Ramos E. Efficacy of amoxicillin and amoxicillin/clavulanic acid in the prevention of infection and dry socket after third molar extraction. A systematic review and meta-analysis. Med Oral Patol Oral Cir Bucal 2016; 21: e494-504.
3. Fisher SE, Frame JW, Rout PG, McEntegart DJ. Factors affecting the onset and severity of pain following the surgical removal of unilateral impacted mandibular third molar teeth. Br Dent J 1988; 164: 351-4.
4. Capuzzi P, Montebugnoli L, Vaccaro MA. Extraction of impacted third molars. A longitudinal prospective study on factors that affect postoperative recovery. Oral Surg Oral Med Oral Pathol 1994; 77: 341-3.
5. Tiigimae-Saar J, Leibur E, Tamme T. The effect of prednisolone on reduction of complaints after impacted third molar removal. Stomatologija 2010; 12: 17-22.
6. Leong CK. Confessions of a schoolman-On dyslexia and laterality. Ann Dyslexia 1984; 34: 15-27.
7. Pençe S. Serebral Lateralizasyon. Van Tıp Dergisi 2000; 7: 120-25.
8. Coren S, Halpern DF. Left-handedness: a marker for decreased survival fitness. Psychol Bull 1991; 109: 90-106.
9. Soysal AS, Ayhan E, Aktürk A, Can H. El Tercihi ve El Tercihini Belirleyen Etkenler. Türkiye Çocuk Hastalıkları Dergisi 2007; 1: 60-8.
10. Annett M. Predicting combinations of left and right asymmetries. Cortex 2000; 36: 485-505.
11. Henderson NJ, Stephens CD, Gale D. Left-handedness in dental undergraduates and orthodontic specialists. Br Dent J 1996; 181: 285-8.
12. Yıldırım S, Dane S. Cerebral Lateralization and Hand Preference. Eurasian J Med 2007; 39: 45-8.
13. Barbalho JC, Vasconcellos RJ, de Morais HH, Santos LA, Almeida RA, Rêbelo HL, et al. Effects of co-administered dexamethasone and nimesulide on pain, swelling, and trismus following third molar surgery: a randomized, triple-blind, controlled clinical trial. Int J Oral Maxillofac Surg 2017; 46: 236-42.
14. Prajapati A, Prajapati A, Sathaye S. Benefits of not Prescribing Prophylactic Antibiotics After Third Molar Surgery. J Maxillofac Oral Surg 2016; 15: 217-20.
15. Pell GJ, Gregory GT. Report on a ten-year study of a tooth division technique for the removal of impacted teeth. Am J Orthod 1942; 28: 660.
16. Schultze-Mosgau S, Schmelzeisen R, Frölich JC, Schmele H. Use of ibuprofen and methylprednisolone for the prevention of pain and swelling after removal of impacted third molars. J Oral Maxillofac Surg 1995; 53: 2-7.
17. Ustün Y, Erdogan O, Esen E, Karsli ED. Comparison of the effects of 2 doses of methylprednisolone on pain, swelling, and trismus after third molar surgery. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2003; 96: 535-9.
18. McGrath C, Comfort MB, Lo EC, Luo Y. Changes in life quality following third molar surgery--the immediate postoperative period. Br Dent J 2003; 194: 265-8.
19. Kim K, Brar P, Jakubowski J, Kaltman S, Lopez E. The use of corticosteroids and nonsteroidal antiinflammatory medication for the management of pain and inflammation after third molar surgery: a review of the literature. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009; 107: 630-40.
20. Jerjes W, Upile T, Kafas P, Abbas S, Rob J, McCarthy E, et al. Third molar surgery: the patient's and the clinician's perspective. Int Arch Med 2009; 2: 32.
21. Joshi AD, Saluja H, Mahindra U, Halli R. A comparative study: efficacy of tissue glue and sutures after impacted mandibular third molar removal. J Maxillofac Oral Surg 2011; 10: 310-5.
22. Pauli P, Wiedemann G, Nickola M. Pain sensitivity, cerebral laterality, and negative affect. 1999; 80: 359-64.
23. Peñarrocha M, Sanchis JM, Sáez U, Gay C, Bagán JV. Oral hygiene and postoperative pain after mandibular third molar surgery. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2001; 92: 260-4.
24. Cakur B, Yıldız M, Dane S, Zorba YO. The effect of right or left handedness on caries experience and oral hygiene. J Neurosci Rural Pract 2011; 2: 40-2.
25. Coren S, Porac C. Fifty centuries of right-handedness: the historical record. Science 1977; 198: 631-2.

26. Addy M. Tooth brushing, tooth wear and dentine hypersensitivity--are they associated? Int Dent J 2005; 55(4 Suppl 1): 261-7.
27. Tezel A, Orbak R, Canakci V. The effect of right or left-handedness on oral hygiene. Int J Neurosci 2001; 109: 1-9.
28. Herrmann DJ, van Dyke KA. Handedness and the mental rotation of perceived patterns. Cortex 1978; 14: 521-9.
29. Özgöz M, Arabaci T, Sümbüllü MA, Demir T. Relationship between handedness and toothbrush-related cervical dental abrasion in left- and right-handed individuals. J Dent Sci 2010; 5: 177-82.
30. Bonnet F, Affret A, Boutron-Ruault MC, Balkau B, Clavel-Chapelon F, Fagherazzi G. Association Between Handedness and Type 2 Diabetes: The E3N Study. Diabetes Care 2015; 38: e199.
31. Ertunç V, Dane S, Karakuzu A, Deniz O. Higher herpes zoster infection frequency in right-handed patients and more frequent appearance in the left body side of females. Acta Derm Venereol 1997; 77: 245.
32. Geschwind N, Behan P. Left-handedness: association with immune disease, migraine, and developmental learning disorder. Proc Natl Acad Sci U S A 1982; 79: 5097-100.
33. Battcock TM, Finn R, Barnes RM. Observations on herpes zoster: 1. Residual scarring and post-herpetic neuralgia; 2. Handedness and the risk of infection. Br J Clin Pract 1990; 44: 596-8.
34. Tan U. The distribution of hand preference in normal men and women. Int J Neurosci 1988; 41: 35-55.
35. Kuralay F, Çavdar Z. İnflamatuar medyatörlere toplu bir bakış. Genel Tıp Derg 2006; 16: 143-52.
36. Demirel H, Bahar A, Gokgoz N, Arslan M, Dane S. Right-sided lateralization of skin temperature in healthy young persons. Clin Invest Med 2016; 39: 27515.
37. Sumner RC, Nowicky AV, Parton A, Wylock C, Cserjesi R, Fischler B, et al. Prospective relationship between hemispheric lateralisation and CD4+ T cells in human immunodeficiency virus type 1. Neuroimmunomodulation 2014; 21: 31-6.
38. Mc Manus IC, Bryden MP. The genetics of handedness, cerebral dominance and lateralization In: Segalowitz SJ, Rapinn I, eds. Handbook of Neurophysiology, Vol 6. Elsevier, Amsterdam, 1992; p.115-45.
39. Rovira-Lastra B, Flores-Orozco EI Ayuso-Montero R, Peraire M, Martinez-Gomis J. Peripheral, functional and postural asymmetries related to the preferred chewing side in adults with natural dentition. J Oral Rehabil 2016; 43: 279-85.
40. Frayne E, Coulson S, Adams R, Croxson G, Waddington G. Laterality of proprioception in the orofacial muscles and temporomandibular joint. Neurosci Lett 2016; 635: 111-6.
41. Rovira-Lastra B, Flores-Orozco EI, Ayuso-Montero R, Peraire M, Martinez-Gomis J. Peripheral, functional and postural asymmetries related to the preferred chewing side in adults with natural dentition. J Oral Rehabil 2016; 43: 279-85.