



A preliminary study on local administration of dexamethasone after tooth extraction — Better preservation of residual alveolar ridge?

Preliminarno ispitivanje lokalne primene deksametazona posle ekstrakcije zuba
– bolja očuvanost rezidualnog alveolarnog grebena?

Srdjan D. Poštić, Ljubomir Todorović

Faculty of Dental Medicine, University of Belgrade,
Belgrade, Serbia

Abstract

Background/Aim. It is important that the height of the edentulous alveolar ridge after tooth extraction remains at a reasonable acceptable level for as long as possible. The aim of this study was to report preliminary results of the clinical effect of local oral submucous administration of dexamethasone after tooth extractions in order to prepare alveolar supporting tissues for acceptance of removable dentures. **Methods.** In a total of 15 patients (11 partially and 4 completely edentulous) the quantity of 0.25 mL to 0.5 mL of dexamethasone was injected buccally and orally in the region of the tooth socket after complicated extractions. **Results.** Healing of extraction wounds was uneventful in all the patients, without pain or local inflammation. **Conclusion.** Dexamethasone can be locally applied to oral tissues to prevent post-extraction inflammation and extensive resorption of the residual alveolar ridge. The obtained results are promising for patients undergoing classic prosthodontic rehabilitation soon after tooth extraction, demonstrating that there are no adverse effects after local oral corticosteroids administration.

Key words:

oral surgical procedures, preprosthetic; tooth extraction; alveolar process; rehabilitation; dexamethasone; treatment outcome.

Apstrakt

Uvod/Cilj. Od ključnog značaja je da visina bezubog alveolarnog grebena posle vađenja zuba ostaje što duže na prihvatljivom nivou. Cilj rada bio je da se prikažu preliminarni rezultati efekata lokalne submukozne primene deksametazona na tkiva iz kojih su ekstrahovani zubi radi pripreme alveolarnih tkiva i nosećih tkiva za prihvatanje zubnih proteza. **Metode.** Kod ukupno 15 pacijenata (11 krezubih i 4 bezzuba) dato je od 0.25 mL do 0.5 mL deksametazona *per injectionem* bukalno i oralno u alveolarne čašice posle komplikovanih ekstrakcija zuba. **Rezultati.** Zarastanja rana kod svih pacijenata bila su neometana, bez bolova ili lokalnih upala. **Zaključak.** Deksametazon može biti lokalno dat u oralna tkiva sa ciljem prevencije postekstrakcione upale i izražene resorpcije rezidualnog alveolarnog grebena. Rezultati studije su obećavajući za lečenje pacijenata koji će biti stomatoprotetski rehabilitovani neposredno posle ekstrakcija zuba i ukazuju na to da nema neželjenih efekata prilikom lokalne primene kortikosteroida na tkiva iz kojih su ekstrahovani zubi.

Ključne reči:

hirurgija, oralna, preprotetske procedure; zub, ekstrakcija; alveolni nastavak; rehabilitacija; deksametazon; lečenje, ishod.

Introduction

Corticosteroids otherwise sovereign anti-inflammatory and anti-oedematous drugs, are frequently used in oral surgery to prevent, or at least minimize, postoperative pain and oedema due to surgical trauma¹⁻³. They can be used locally or systemically, administered by injection or orally⁴. Although corticosteroids have several general effects⁵, their single use (preoperative or postoperative) is supposed not to have any undesired effect on the adrenal-pituitary regulation of steroid secretion¹.

The problem of edentulous ridge reduction has been noted in the dental literature for many years. A number of authors have discussed this problem due to difficulties for orofacial rehabilitation by means of proper denture design^{6,8}. It is well known that marked atrophy and reduction of alveolar bone following tooth loss complicate prosthodontic rehabilitation^{7,9-11}. Difficulties have been encountered even in taking impressions of edentulous jaws with reduced and resorbed edentulous ridges¹¹, as well as in achieving and maintaining the stability of fabricated acrylic dentures, particularly in the mandible¹¹. Consequently,

edentulous patients with the resorbed residual ridges have serious problems in chewing with dentures^{9, 11, 12}. For these reasons it is crucially important that the height of the edentulous alveolar ridge, after tooth extraction, remains at a reasonable acceptable level for as long as possible. Additionally, it is necessary that fabricated acrylic dentures, through constant pressure on the edentulous ridge, do not cause delayed resorption of residual ridge.

It is possible that steroids, due to their marked local anti-inflammatory effect could lessen the ridge resorption after tooth extraction as one of the possible reasons for this event is local tissue inflammation as a consequence of tissue injury. The aim of this study was to report preliminary results of the clinical effect of local oral submucous administration of dexamethasone after tooth extractions in order to prepare alveolar supporting tissues for the acceptance of removable dentures.

Methods

A total of 15 otherwise healthy patients (without visible symptoms of local osteoporosis, or any other intraoral disorder except tooth caries or periodontal disease), 11 partially and 4 completely edentulous (9 women aged 45–52 years, and 6 men aged 54–63 years), undergoing tooth extraction prior to classic prosthodontic rehabilitation, were included into the study. Altogether, 23 teeth were removed, 3 teeth at the most in a single patient. In each patient, at least one extraction was difficult, meaning the need for a bone portion removal with burs, or removal of a part of buccal or lingual cortical plate.

To prevent an extensive post-extraction bone resorption and possible complications of extraction wound healing, immediately after the completion of difficult tooth extraction, a submucous 0.5 mL dexamethasone injection (Dexason[®], Galenika, Belgrade) was administered, buccally and orally (altogether 4 mg of dexamethasone), beside the socket of the tooth that was removed with difficulties (Figure 1).

All the patients were followed-up regularly, and prosthodontic rehabilitation with removable partial or full dentures started two weeks afterwards.



a)



b)

Fig. 2 – The lower (a) and upper (b) jaw 2 weeks after local administration of dexamethasone.



Fig. 1 – Dexamethasone injection beside the post-extraction wound.

Results

After administration of dexamethasone, no symptoms of local pain or inflammation, or any other complication, were noted (Figure 2).

The bones of the alveolar ridge were solid enough to enable making of dentures without the need of any additional plastic procedure, and control radiographs (Figure 3) revealed the absence of signs of undesired bone remodelling or extensive resorption.



Fig. 3 – Control radiogram after the wound had been healed.

Figure 4 shows the favorable finding of the upper jaw in one patient, 2 weeks after local administration of dexamethasone.



Fig. 4 – The upper jaw of a female patient 2 weeks after local administration of dexamethasone.

Consequently, all the patients were successfully rehabilitated with removable dentures (Figure 5).



Fig. 5 – Local finding after the complete dentures had been made.

Discussion

The anti-inflammatory effect of corticosteroids has been proved for many local or systemic disorders^{13, 14}. Therefore, indications for the use of corticosteroids due to their anti-inflammatory effect are wide, ranging from any kind of local inflammation to many postoperative complications in oral and maxillofacial surgery. Therefore, the use of corticosteroids has also been recommended for pain reduction, oedema, and trismus following oral surgical procedures^{1, 2, 4}.

Dexamethasone was injected beside the post-extraction socket so that it could demonstrate maximal anti-inflammatory effect and remain locally and not rinsed by salivary flow. It was injected in a total dose that is usually used for single intraoral application when anti-inflammatory dexamethasone effect is desired¹⁻⁴. It was considered not to use dexamethasone if patients had any possible contraindication for steroid use^{5, 15}, and such patients were excluded from the study.

Although the anti-inflammatory effect of dexamethasone is well-known, there are no studies investigating its possible influence on the reduction of post-extraction alveolar ridge resorption. In spite the fact that all the 15 treated patients in this preliminary study had difficult tooth extractions, the wound healing in the post-extraction period was uneventful, and the residual alveolar ridge did not demonstrate signs of excessive resorption or malformation. We believe that this is mainly due to anti-inflammatory effect of the used dexamethasone. However, the number of treated patients is relatively small, and a double-blind controlled trial is under way to confirm possible favourable effect of dexamethasone in wound healing after tooth extraction.

Conclusion

Dexamethasone can be locally applied to oral tissues to prevent post-extraction inflammation and extensive resorption of the residual alveolar ridge. The obtained results are promising for patients undergoing classic prosthodontic rehabilitation soon after tooth extraction, demonstrating that there are no adverse effects of such corticosteroids use.

Acknowledgment

This study was supported by Grant No 175021 from the Ministry of Education, Science and Technological Development of the Republic of Serbia.

R E F E R E N C E S

1. Alexander RE, Thronson RR. A review of perioperative corticosteroid use in dentoalveolar surgery. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2000; 90(4): 406–15.
2. Montgomery MT, Hogg JP, Roberts DL, Redding SW. The use of glucocorticosteroids to lessen the inflammatory sequelae following third molar surgery. *J Oral Maxillofac Surg* 1990; 48(2): 179–87.
3. Gersema L, Baker K. Use of corticosteroids in oral surgery. *J Oral Maxillofac Surg* 1992; 50(3): 270–7.
4. Markovic A, Todorovic Lj. Effectiveness of dexamethasone and low-power laser in minimizing oedema after third molar surgery: a clinical trial. *Int J Oral Maxillofac Surg* 2007; 36(3): 226–9.
5. Falkenstein E, Tillmann HC, Christ M, Fewring M, Webling M. Multiple actions of steroid hormones: a focus on rapid, non-genomic effects. *Pharmacol Rev* 2000; 52(4): 513–56.
6. Atwood DA. Reduction of residual ridges: a major oral disease entity. *J Prosthet Dent* 1971; 26(3): 266–79.
7. Zmyslowska E, Ledzjon S, Jedrzejewski K. Factors affecting mandibular residual ridge resorption in edentulous patients: a preliminary report. *Folia Morphol (Warsz)* 2007; 66(4): 346–52.

8. *Ortman HR*. Factors of bone resorption of the residual ridge. *J Prosthet Dent* 1962; 12(3): 429–40.
9. *Xie Q, Närhi TO, Nevalainen JM, Wolf J, Ainamo A*. Oral status and prosthetic factors related to residual ridge resorption in elderly subjects. *Acta Odontol Scand* 1997; 55(5): 306–13.
10. *Poštić S, Marković D, Krstić M, Rakočević Z, Brković S*. Radiographic assessment of edentulous residual ridge reductions. Proceedings of the 15th Congress of the BaSS; 2010 April 22–25; Greece, Thessaloniki; 2010.
11. *Zarb GA, Bolender CL, Eckert SE, Jacob RF, Fenton AH, Meric-*skae-Stern R**. Prosthodontic treatment for edentulous patients: Complete dentures and implant-supported prostheses. St. Louis: Mosby; 2004.
12. *Maeda Y, Wood WW*. Finite element method simulation of bone resorption beneath a complete denture. *J Dent Res* 1989; 68(9): 1370–3.
13. *Stoll ML, Good J, Sharpe T, Beukelman T, Young D, Waite PD, et al*. Intra-articular corticosteroid injections to the temporomandibular joints are safe and appear to be effective therapy in children with juvenile idiopathic arthritis. *J Oral Maxillofac Surg* 2012; 70(8): 1802–7.
14. *ElHag M, Coghlan K, Christmas P, Harvey W, Harris M*. The anti-inflammatory effects of dexamethasone and therapeutic ultrasound in oral surgery. *Brit J Oral Maxillofac Surg* 1985; 23(1): 17–23.
15. *Assimes TL, Lessard LM*. The use of perioperative corticosteroids in craniomaxillofacial surgery. *Plast Reconstr Surg* 1999; 103(1): 313–22.

Received on November 4, 2012.

Revised on February 4, 2013.

Accepted on February 7, 2013.

OnLine-First February, 2014.