www.sada.co.za / SADJ Vol. 79 No.4

What's new for the clinician – summaries of recently published papers (May 2024)

SADJ MAY 2024, Vol. 79 No.4 p212-214

Edited and compiled by Prof V Yengopal, Faculty of Dentistry, University of the Western Cape

1. Can concentrated growth factor prevent postoperative complications of impacted third molar surgery? A split-mouth randomised double-blind trial

Extraction of impacted mandibular third molars is often associated with several postoperative complications such as bleeding, pain, swelling, trismus, nerve injury and alveolar osteitis.[1] Additionally, alveolar bone defect distal to the second molar is a common sequela after impacted third molar extraction.[1]

The causes of such sequelae are presumed to be due to pericoronitis, difficulty of operation, duration of surgical procedure, peri-operative infection and so on. Besides adopting a minimally invasive surgical procedure and conscientious peri-operative care, other strategies have been utilised to minimise the risk of complications and limit their intensity, such as drug therapies, laser treatment and blood concentrates which have been shown to decrease inflammatory signs and symptoms after mandibular third molar surgery.[1]Growth factors are considered as the best tissue regenerative stimulus, which have been clinically proven to promote wound healing and tissue regeneration.[1] Platelets are one of the major resources of autologous growth factors. Platelet concentrate (PC) products have developed from platelet-rich plasma (PRP) and platelet-rich fibrin (PRF), to the third autologous generation-concentrated growth factor (CGF).[1] It is a biomaterial providing a sustained release of various growth factors, including transforming growth factor β-1(TGF β-1), platelet derived growth factor (PDGF) and vascular endothelial growth factor (VEGF). In addition, several pro- and anti-inflammatory cytokines can also be produced by CGF, such as tumour necrosis factor-α (TNF-α), interleukin 4 (IL-4), interleukin 6 (IL-6) and interleukin-1 β (IL-1β).

There has been very little research into the effects of concentrated growth factor (CGF) on postoperative complications and tissue remodelling following third molar extraction.[1] Haung and Xu (2024)[1] reported on a randomised clinical trial that sought to determine whether local application of CGF in the extraction socket could minimise postoperative complications, as well as hard tissue regeneration in patients who underwent mandibular third molar extractions.

MATERIALS AND METHODS

A split-mouth randomised double-blind clinical study was performed among 25 patients (50 sites) requiring bilaterally impacted mandibular third molar extractions at a hospital in China.

All the patients had undergone clinical and radiographic examination preoperatively. Inclusion criteria were as follows: (1) patients aged between 18 and 35 years; (2) patients having bilaterally impacted mandibular third molars in comparable positions (mesioangular or horizontal); (3) good oral hygiene and CPI is no more than 3; (4) absence of systemic diseases such as hypertension, diabetes mellitus, systemic endocrine disorders, kidney diseases and osteoporosis; (5) coagulogram showing normal platelet count (150,000-400,000 p/mm^3); (6) cooperative participants able to attend follow-up appointments.

Exclusion criteria were: (1) pericoronitis in the surgical region; (2) periodontal disease at the time of operation; (3) absence of adjacent second molars; (4) antibiotic or steroid use in the previous three months; (5) patients under orthodontic treatment; (6) smokers or alcoholics; (7) women during the period of menstruation, pregnancy or lactation

.

Randomisation was performed by coin toss to choose the test and control sites before the commencement of surgery. CGF was placed in the extraction socket and the socket was sutured (test group), while the contralateral socket was only sutured (control group). Each patient acted as their own control. The surgical procedure, from administering local anesthesia to extraction of the two teeth, was carried out by the same surgeon who was blinded to the CGF placement site to avoid performance bias. To blind the patients regarding the site in which CGF was inserted, they received dark glasses and the second operator manipulated both sockets in the same manner simulating insertion of CGF in both sites. The evaluation and analysis of outcomes were performed by the same assessor who was also blind to the randomisation of the groups until study completion, ensuring the concealment of the allocation sequence at the time the patients were recruited.

CGF was prepared according to the technique described by Sacco.[1] Fresh venous whole blood was obtained from the patients in sterilised 10ml tubes without anticoagulants, which was centrifuged immediately using CGF centrifuge equipment under the following measures: 2 min at 2,700rpm, 4 min at 2,400rpm, 4 min at 2,700rpm and 3 min at 3,000rpm. After the procedure, there were three layers in the tubes: the upper layer containing platelet-poor plasma (PPP), the middle layer containing growth factors and unipotent stem cells and the lower layer containing red blood cells (RBC). The CGF clot was taken out of the tube after centrifugation and separated from the red blood cells using scissors.

Patients underwent bilateral surgical extraction at the same appointment using a standardised approach. An incision in the distal region of the gingival sulcus of the second molar and an oblique mesial side incision were applied and the mucoperiosteal flap was raised. The third molars were luxated and extracted using elevators. The bone, soft tissue residue and debris in the sockets was removed. The sockets were then thoroughly irrigated with sterile 0.9% saline. On the test site, CGF clot was placed in the socket, while on the control site, there was no application to the extraction socket. Primary closure of both extraction sockets was performed with 4/0 atraumatic silk sutures. Postoperatively,

all patients were prescribed antibiotics (amoxicillin, 500mg, 8 hourly for 3 days) and mouthwash (0.2% chlorhexidine twice daily for 7 days). Patients were told about the postoperative instructions and periodic follow-up. Sutures were removed on the seventh postoperative day.

The primary outcome were pain and facial swelling on the first, third and seventh postoperative days. Pain was assessed by visual analogue scale (VAS). Facial swelling was first measured before surgery as the baseline. The secondary outcomes were bone healing in extraction sockets through the evaluation of alveolar bone height (ABH) and alveolar bone density (ABD) by cone beam computed tomography (CBCT) immediately after extraction and after three and six months. The radiographic variables were ABH and ABD on CBCT images immediately after extraction (at baseline) and after three and six months.

RESULTS

A total of 25 patients, 12 female and 13 males, with an age range of 18 to 35 years (mean age 29.17 ± 5.32 years), underwent bilateral mandibular third molar extraction surgeries ($n = 50$). Each patient acted as their own control. There were no significant differences between groups in age, gender, operation duration and the baseline study variables ($p > 0.05$). The surgeries were well accepted by all patients, and there were no serious adverse effects such as infection, alveolitis, paraesthesia or fracture through the follow-up period in all of the cases.

The test group showed a statistically significant decrease in the VAS scores on the third and seventh postoperative days as compared to the control one, although there was no statistically significant difference in the VAS scores between the groups on the first postoperative day (third day, $p = 0.009$; seventh day, $p = 0.039$). The mean values of the facial swelling level were slightly lower in the test group than the control group postoperatively, but no statistically significant difference was found ($p > 0.05$).

Although CBCT evaluation showed significantly higher ABH and ABD of both groups after three and six postoperative months compared to the baseline (immediately after extraction), there were no statistically significant differences in ABH and ABD between the CGF and control groups at different time intervals ($p > 0.05$).

CONCLUSION

The researchers found that the local application of CGF had a positive effect on postoperative pain relief after the extraction of mandibular third molars even though CGF does not add any advantages in minimising facial swelling and promoting bone generation compared to natural healing.

IMPLICATIONS FOR PRACTICE

CGF is recommended during third molar extractions due to its good biological effects, low cost and simple preparation procedures.

REFERENCE

Huang C, Xu Y. Can concentrated growth factor prevent postoperative complications of impacted third molar surgery? A split-mouth randomized double-blind trial. Clinical Oral Investigations. 2024 Apr 1;28(4):234.

2. Complementary and alternative therapies for managing postoperative pain after lower third molar surgery: a systematic review and network meta-analysis

Lower third molar surgery (LTMS) stands out as a procedure often associated with the highest incidence of postoperative complications in dentistry. Thus, oral surgeons are keenly int erested in strategies to mitigate these complications, particularly postoperative pain, which ranks as the most significant issue, followed by swelling, trismus, paraesthesia, anesthesia, dysesthesia, hyperalgesia and allodynia.

Many approaches have been explored to identify optimal methods for controlling postoperative pain following LTMS, including pre-emptive analgesia, postoperative analgesia and intrasocket interventions.[1] Pre-emptive and postoperative analgesia have been well established in the literature, testing a range of medications such as corticoids or non-steroidal anti-inflammatory drugs, which demonstrated efficacy. Intrasocket interventions, specifically platelet-rich fibrin (PRF) and chlorhexidine, have also emerged as favourable choices for controlling postoperative pain. Despite conventional methods, a substantial number of patients report moderate to severe pain in the initial days following LTMS.

In this context, alternative and complementary medicine presents itself as a potential avenue for enhancing postoperative pain control. Techniques such as lower-level laser therapy (LLLT), kinesio tapping (KT), ozone therapy (OT), ice compression and acupuncture, commonly used in other medical domains to manage pain, are now being explored for their applicability in the context of LTMS.
This systematic review aimed to assess whether alternative or complementary treatments, when compared to placebo or non-treatment, can indeed reduce postoperative pain after LTMS.

METHODS

The present systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines, with extension for networking meta-analysis (PRISMA-NMA). Electronic databases were searched: Embase, MEDLINE (PubMed) and Cochrane Library. Clinical trials and the grey literature (Google Scholar) were also assessed to find potential ongoing and unpublished studies. The search strategy in each database was conducted up to May 2022. There were no publication date and language restrictions. Reference lists of previous systematic reviews and of primary studies were also verified.

Two authors performed the search process independently. After duplicates removal, titles and abstracts of the retrieved references were screened. Those not fulfilling the eligibility criteria were removed. The remaining references were assessed in full to confirm their inclusion, following the PICOS question: **(P)** healthy (ASA I or II) patients who underwent asymptomatic impacted lower third molar surgical removal; **(I)** alternative non-pharmacological therapies such as acupuncture, LLLT, KT, massage, cryotherapy, OT, heat therapy, pulsed electromagnetic field

www.sada.co.za / SADJ Vol. 79 No.4

therapy, lymph drainage etc; **(C)** placebo therapy or non-treatment; **(O)** postoperative pain at first, second, third and seventh postoperative days; **(S)** human randomised clinical trials (parallel or split-mouth designed). At this stage, more articles were excluded and the reasons were recorded.

Exclusion criteria comprised studies in which the primary condition was not the removal of a third molar, and when teeth other than third molars were also extracted. Any disagreement between the two authors in the study selection process was solved consulting a third author.

The same two authors independently extracted data from the included studies based on a previous designed extraction data form. Collected data comprised: author and year of publication, country of origin, study design (parallel or split-mouth), sample size, sex, mean age, third molar extracted in each surgery, type of anesthesia (local or general), drug protocol, tested treatments and evaluated outcomes. If necessary, the authors of the included studies were contacted for any important missing data.

The risk of bias of the included studies was assessed through the Cochrane risk of bias tool of parallel or crossover randomised trials (RoBs 2). The checked domains were: (1) randomisation process, (2) deviations from intended interventions, (3) missing outcome data, (4) measurement of the outcome, (5) selection of the reported results. Each domain has some questions generated by an algorithm. At the end, the overall risk of bias was classified as low, unclear or high.

The web application Confidence in Network Meta-Analysis (CINeMA) was used to assess the certainty of evidence by results from networking meta-analysis. In this system netmeta package from R System was used to analyse heterogeneity and relative effect from studies. The assessment involves the following six domains: within-study bias; reporting bias; indirectness; imprecision; heterogeneity; and incoherence. Each domain was judged as no concerns, some concerns or major concerns. Thus, judgments across the six domains were summarised in four levels of confidence: very low, low, moderate or high.

To perform statistics for pain, the type of alternative treatment, mean pain value, standard deviation and number of participants in each treatment group were extracted from the included RCTs. First, pairwise meta-analysis was performed to compare placebo to each type of treatment and verify the effectiveness of interventions. Then, three Network meta-analyses (NMAs) were performed: the first one with placebo or no-treatment as the comparison group; the second with only placebo as the comparison group; and the third one with only no-treatment in the comparison group.

RESULTS

A total of 1,965 papers were initially identified. After duplicates removal, 1,280 papers underwent screening. Initially, 1,090 papers were excluded based on the reading of titles and abstracts. Subsequently, 82 papers were included in the qualitative analyses and 33 of these integrated into the meta-analysis. Twenty-one papers were split-mouth trials and 12 were parallel RCTs.

A cohort of 4,575 individuals underwent third molar surgery. From these, 1,428 participants were considered for the Network meta-analysis (NMA). NMA revealed that drainage tube and kinesio-taping were superior in controlling pain 24 hours postoperatively than no treatment. At 48 hours' follow-up, kinesio-taping and LLLT (laser) were more effective than placebo and drainage tube; and kinesio-taping and LLLT were superior to no treatment. At 72 hours postoperatively, ozone therapy was superior to placebo; and drainage tube, kinesio-taping and LLLT were better than no treatment. At seven days' follow-up, ozone and LLLT were superior to placebo; and LLLT (laser) and kinesio-taping were superior to no treatment. The SUCRA-ranking placed drainage tube was the top-ranking intervention at 48-hour (98.2%) and 72-hour (96%) follow-ups, and ozone (83.5%) at the seven-day follow-up.

CONCLUSION

The review findings suggest that these alternative and complementary therapies may be useful in reducing postoperative pain after lower third molar surgeries, and may offer advantages when combined with traditional pain management methods.

IMPLICATIONS FOR PRACTICE

This review found that some of these alternate therapies, specifically kinesio-taping and drainage tube, were effective in controlling postoperative pain after third molar surgeries. These findings have important implications for clinical practice as they highlight the potential benefits of incorporating these therapies into postoperative pain management plans.

REFERENCE

1. Falci SG, Fernandes IA, Guimarães MT, Galvão EL, de Souza GM, Al-Moraissi EA. Complementary and alternative therapies for managing postoperative pain after lower third molar surgery: a systematic review and network meta-analysis. Clinical Oral Investigations. 2024 Mar 28;28(4):231.

CPD questionnaire on page 224

The Continuing Professional Development (CPD) section provides for twenty general questions and five ethics questions. The section provides members with a valuable source of CPD points whilst also achieving the objective of CPD, to assure continuing education. The importance of continuing professional development should not be underestimated, it is a career-long obligation for practicing professionals.