

What's new for the clinician?

- excerpts from and summaries of recently published papers

SADJ February 2020, Vol. 75 No. 1 p43 - p47

Compiled and edited by V Yengopal

1. 6-mm vs 11-mm implants for full-arch rehabilitation of the edentulous mandible

L Guida, M Annunziata, U Esposito, M Sirignano, P Torrisi, D Cecchinato.
Clinical Oral Implants Research. 2020; 31: 64-73.

The clinical use of dental implants in the rehabilitation of totally and partially edentulous patients represents a well-documented long-term and highly predictable procedure with almost 100% survival rates over long term periods (> 5 years).¹ One of the main limitations for correct implant placement, however, still remains the availability of a sufficient amount of bone at the implant site. When there is reduced bone height, standard length fixtures can be inserted only after advanced reconstructive surgical treatments, with a consequent increase in financial and biological demands on the patient (additional costs, longer treatment time, increased postoperative morbidity, and greater risk of complications).¹

The use of short implants for the rehabilitation of atrophic sites in order to avoid the disadvantages of vertical bone augmentation procedures, has greatly expanded in recent years, with promising results.

Short implants offer benefits in terms of less invasive surgery, ease of handling, and reduced risk of damaging anatomical structures, thus supporting the concept of a "stress-minimizing surgery". However, the efficacy of short dental implants has been a matter of debate in the recent literature with mixed findings reported. Guida and colleagues from Italy (2020) reported on a randomized controlled clinical trial that sought to evaluate the efficacy of 6-mm-short implants compared with 11-mm-long implants supporting fixed full-arch mandibular prostheses in patients with a fully edentulous mandible, avoiding the need for bone augmentation procedures. The null hypothesis for this study was that there was no difference in terms of marginal bone level change between short and longer implants from prosthetic installation to one and three years of follow-up.

Veerasamy Yengopal: BChD, BScHons, MChD, PhD, Community Dentistry Department, School of Oral Health Sciences, University of Witwatersrand, Medical School, no. 7 York Road, Parktown 2193, South Africa.
ORCID Number: 0000-0003-4284-3367
Email: veerasamy.yengopal@wits.ac.za

MATERIALS AND METHODS

This study was designed as a multicentre parallel-group randomized controlled clinical trial (RCT) with a 1:1 allocation ratio. Patients were enrolled at the three involved centres. Inclusion criteria were aged between 18 and 75 years, total mandibular edentulism for at least eight months, sufficient amount of native bone (no previous bone augmentation procedures) in the recipient sites to allow the installation of five implants with length \geq 11 mm and width 4 mm being circumferentially surrounded by \geq 1 mm of peri-implant bone, systemic health, and compliance with good oral hygiene.

Exclusion criteria were any disease, medication or drug that could jeopardize healing, osseointegration or treatment outcome, severe bruxism or other parafunctional habits, unrealistic aesthetic demands. Smokers were not excluded, however, the smoking habit was registered as heavy smoker (\geq 10 sig./day), light smoker ($<$ 10 sig./day), non-smoker, or former smoker.

Patient eligibility in terms of bone dimensions was determined on computer tomography (CT) scans, with the aid of an implant planning software (Simplant, Dentsply Sirona Implants). Thirty patients were selected in three study centres to receive a fixed full-arch mandibular rehabilitation supported by five inter-foraminal implants.

The primary outcome of the study was the radiographic marginal bone level change (MBLc) around 6-mm-short and 11-mm-long implants, evaluated from prosthetic installation to one and three years of follow-up.

The secondary outcomes included (a) implant survival rate, (b) prosthesis survival rate, and (c) biological or technical complications. Surviving implant or prosthesis were those still in function at the last follow-up.

Biological complications were considered peri-implant mucositis and peri-implantitis. Technical complications were considered prosthesis fracture, screw loosening or fracture, implant fracture and veneer fracture.

Eligible patients received a complete anamnestic and clinical examination; hopeless teeth were extracted; caries and periodontal lesions on the remaining teeth were treated. The prosthetic project was accurately planned on cast models mounted in an articulator. When possible, the previous denture was used as a reference.

The randomization and the allocation concealment were carried out using sealed opaque envelopes created following a computer-generated randomization list by a person not otherwise involved in the study. Such envelopes were consecutively opened at the leading center and communicated to the surgeon at the moment of the first surgery.

Surgeries were performed by expert clinicians and the surgical protocol was shared among all three centers. The implant positioning was carried out with the help of a computer-aided bone-supported surgical guide (Simplant, Dentsply Sirona). In the test group, 5 short (6-mm-length) implants were placed, while in the control group 5 long (11-mm-length) implants were used.

Minimal measurements of 3 mm of inter-implant distance and of 1 mm of bone at the buccal and lingual aspects were required, with no need for augmentation procedures (if augmentation was required, the patient would have been excluded from the study). If needed, an osteoplasty of the alveolar ridge was done by means of a carbide-cutting bur mounted on a straight surgical handpiece. The implant head was placed flush to the bone. At the end of the surgical procedure cover screws were positioned and a careful adaption of the flaps by means of an accurate suture was assured in order to obtain primary closure and full periosteal coverage.

The patients were instructed to rinse with a chlorhexidine 0.12% mouthwash twice a day for two weeks and to avoid using the denture. Liquid and semisolid food was prescribed for the first postoperative week, after which the sutures were removed.

Two weeks after the surgery, the denture was properly relined, avoiding direct contact with the fixture until the second-stage surgery. Patients were controlled at four, eight and 12 weeks.

After three months of healing all implants were exposed by separated linear incisions, cover screws were removed and replaced by healing abutments. After one week, the final abutment was screwed on each implant and an abutment-level impression was registered. Expert clinicians followed all the prosthetic phases.

All patients received a fixed screw-retained full-arch prosthesis with distal cantilevers. It consisted of a cobalt-chrome framework, fabricated according to the Cresco method (Dentsply Sirona Implants) and covered by an acrylic veneer. The length of the bridge cantilevers was duly calculated to minimize implant overloading. All prosthetic procedures were made according to the Astra Tech Implant System procedures and products manuals.

Patients were instructed in proper hygiene measures, suitably designed on individual needs, including tooth brushing, interdental brushing, flossing, and rinses with a chlorhexidine 0.12% mouthwash. Patients were recalled every six months for professional supragingival infection control, including ultrasonic debridement and polishing.

Radiographs and clinical examinations of the restored segments were performed at baseline (permanent restoration placement), and after one and three years of loading. Marginal bone level change [MBLc] (primary outcome), implant survival rate, prosthesis survival rate, and biological/technical complications (secondary outcomes) were registered.

For MBLc measurements, peri apical radiographs were taken at the baseline and after one and three years of loading. Early or late (before and after prosthetic loading, respectively) implant losses were registered, as well as any other biological or technical complications which occurred during the study period.

RESULTS

Thirty patients (15 per group) were enrolled and randomly allocated to the test and control groups. More female patients were enrolled in the test group ($p = 0.02$), but there were no other inter-group differences at the baseline for any of the considered variables.

A total of 150 implants (5 per patient, 75 per group) were inserted. All patients were re-evaluated at one and three years of follow-up, from December 2012 (the first one-year follow-up visit) to March 2019 (the last three-year follow-up visit).

Between the one- and three-year follow-ups, one patient (control) did not attend control visits and another one (test) died, so that 14 test patients and 14 control patients were available to be evaluated at the three-year follow-up. No implant or prosthesis failure was registered (100% survival rate in both the test and control groups). In one patient (control), there was a wound dehiscence within the first two weeks of healing and the placement of healing screws on three exposed implants was anticipated.

In two patients (one test and one control), two implants per patient suffered, during the first year of function, from peri-implant mucositis, resolved by professional cleaning and 1% chlorhexidine gel application every week for one month. No other biological complications requiring additional chair-time were observed.

In three patients (test), a fracture of the acrylic veneer was registered and repaired. Three cantilever fractures happened in two control patients (after two years of function) and one test patient (after one year of function) and were repaired by laser welding after prosthesis removal. Two had natural teeth and one had a removable denture at the opposite arch. No other complications that might have required chair-time were observed. No significant inter-group differences for any of the registered complications were found.

No statistically significant difference in terms of MBLc between baseline and one- and three-year follow-up visits in both groups, as well as between test and control group at all follow-up visits was observed. There were no significant correlations between MBLc and any of the patients' demographic variables (centre, age, gender, and smoking habit) at any time point when each group was analysed separately and when data from both group were pooled together.

CONCLUSION

The researchers concluded that short (6 mm) implants may be a reliable option when used in the rehabilitation of a total edentulous mandible, with clinical and radiographic outcomes, up to three years of loading, comparable to those of long implants (11 mm).

2. Postoperative pain following endodontic irrigation using 1.3% versus 5.25% sodium hypochlorite in mandibular molars with necrotic pulps

MEHAA Mostafa, YAI El-Shrief, WIO Anous, MW Hassan, FTA Salamah, RM El Boghdadi, MAA El-Bayoumi, RM Seyam, KG Abd-El-Kader, SAW Amin. International Endodontic Journal, 2020; 53: 154-66.

Postoperative pain is common after root canal treatment and is mainly attributed to mechanical, chemical and microbiological factors. Several factors can influence post-endodontic pain including pre-treatment, intra-treatment or post-treatment factors.

Intra-treatment factors include the number of visits, the type of irrigant and/or intracanal medication, the root canal instrumentation technique and the root filling technique. Methods to prevent post-endodontic pain, thus, include the selection of instruments, instrumentation techniques, devices and the chemicals used during treatment.

Several irrigants have been used during root canal treatment of which sodium hypochlorite (NaOCl) is the most common, due to numerous advantages including its antimicrobial activity, antibiofilm activity and organic tissue dissolution potency. However, it also is an irritant to periapical tissues, especially at high concentrations, and can induce an inflammatory reaction even at concentrations as low as 0.5%.

Various concentrations of NaOCl are used by dental practitioners varying from 0.5% to \approx 8% with a tendency towards using higher concentrations. The effect of different NaOCl concentrations on teeth with non-vital pulps is yet to be assessed.

Mostafa and colleagues (2020)¹ reported on a randomized clinical trial that sought to compare the effect of two NaOCl concentrations, 1.3% and 5.25%, on post-endodontic pain and on rescue medication intake in patients with non-vital pulps in mandibular molars, undergoing root canal treatment over two visits.

Implications for practice

This study supports the concept of a minimally invasive, low-stress, simplified implant therapy, with absolute benefits for both patients and clinicians. However clinicians should note the strict patient selection criteria and the small sample size before applying these findings to all patients.

Reference

1. Guida, L, Annunziata, M, Esposito, U, Sirignano, M, Torrisi, P, Cecchinato, D. 6-mm-short and 11-mm-long implants compared in the full-arch rehabilitation of the edentulous mandible: A 3-year multicenter randomized controlled trial. *Clin Oral Impl Res.* 2020; 31: 64-73.

MATERIALS AND METHODS

This was a prospective, two-arm, parallel-group, double-blind, single-centre, randomized, clinical trial. Eligible patients for inclusion in this study were systemically healthy subjects between the age of 25 and 45 years with a mandibular molar (first or second) with non-vital pulp with or without radiographic evidence of apical periodontitis; symptomatic and asymptomatic patients were included.

Patients were excluded if they were pregnant or lactating females; had a history of sensitivity or adverse reactions to any of the medications or materials used in this study; had acute periapical or periodontal abscess, or badly decayed crowns; were retreatment cases; or had severely curved root canals. Patients who took a preoperative premedication that could alter pain perception (e.g. analgesics) within at least 12 hrs. before treatment were also excluded. Of 463 patients assessed for eligibility, 308 were included.

The included patients had a diagnosis of symptomatic or asymptomatic mandibular molars with nonvital pulps, associated or not with radiographic evidence of apical periodontitis. After instruction, patients recorded their preoperative pain on a 0-10 numerical rating scale with 0 indicating 'No pain' and 10 indicating 'The worst pain.' The pain scores were categorized into four categories as follows: 0 = none, 1-3 = mild, 4-6 = moderate and 7-10 = severe. Included patients had a negative response to electric pulp sensitivity testing and cold thermal testing.

Definitive pulp status was confirmed during access cavity preparation through lack of bleeding. Patients with or without pain on percussion were included. Periapical

radiographs were taken to assess the status of the periapical structures; patients with normal structures or periapical radiolucency were included.

Root canal treatment was carried out in two visits using a standardized protocol. After access preparation in the first visit, each tooth was isolated using rubber dam and then patients were randomly assigned, according to the NaOCl concentration used, to either of the following groups: 1.3% NaOCl or 5.25% NaOCl. The patients and operators were unaware of the assigned group throughout the duration of the study.

The pulp chamber was filled with 3 mL irrigant. The patency of canals was established, and an initial glide path was prepared using size 10 and size 15 K-files. After coronal pre-flaring, the working length (WL) was determined using an apex locator and radiographically confirmed to be 0.5-1 mm short of the radiographic apex.

Root canals were mechanically prepared using a nickel-titanium rotary system (ProTaper Universal, Dentsply Sirona) in a torque-controlled endodontic motor according to the manufacturer's sequence and recommendations of speed and torque.

Syringe irrigation was done using 3mL irrigant with a 27-gauge, notched-tip needle between each two consecutive instruments. Needle penetration depth in the canal was 3mm shorter than the WL of the canal after preparing the canal to the master apical instrument as adjusted by rubber stoppers. The final flush was done using 5mL saline.

At the end of the first visit, the canals were dried using paper points, a dry cotton pellet was placed in the pulp chamber, and the access cavity was sealed with a temporary filling (Cavit) without intracanal medication. In the second visit 7 days later, a rubber dam was placed and the temporary filling was removed.

Root canals were irrigated using the same irrigant concentration as on the first visit, and the canal walls were re-prepared using the instrument size last used on the first visit before the canals were dried. Canal filling was carried out using the modified single-cone technique with matched-size gutta-percha cones (ProTaper Universal) and an epoxy resin-based sealer (AH Plus).

The tooth was temporized using a cotton pellet and temporary filling. A postoperative periapical radiograph was taken for each patient and evaluated for the following features: the extent of root canal filling ('adequate filling' within ≤ 2 mm from the radiographic apex, 'underfilling' or 'overfilling'), the taper and width of filling ('overinstrumentation' was considered if the filling was wide and/or showed overflaring; 'underinstrumentation' was considered if the filling was thin and/or showed underflaring) and/or the presence of a fractured instrument, a ledge or a perforation; such data were recorded for each patient.

Each patient received a pain diary to record pain levels at the following time-points: immediately after instrumentation, three, 24, 48 hours and seven days after the first

visit and, on the second visit, immediately after root filling. Pain was assessed using a 0-10 numerical rating scale. Patients were asked to mark the number that represented their pain level. Patients were contacted by their operator at each time-point to check and to remind them to record their pain. After the first visit, each patient was dismissed with a capsule (containing powdered milk), as sham analgesic, to be taken in case of pain. If pain persisted, the patient was instructed to contact the operator who would then prescribe an analgesic (Ibuprofen 600 mg). The patients were asked to record whether they took the sham only or the analgesic as well in the pain diary. The patients delivered their pain charts in the second visit after seven days.

RESULTS

Of the 308 included patients, 178 were females and 130 were males. The age range was from 25 to 45 years with an overall mean age of 31.87 ± 5.82 years. The study included 235 first and 73 second mandibular molars. 57% (175/308) of the patients had pain on percussion and 40.6% (125/308) had a periapical radiolucency. Both groups were similar regarding baseline data.

The 1.3% NaOCl group was associated with significantly less pain intensity than the 5.25% NaOCl group at all the time-points ($P < 0.05$). For both groups, a significant decrease in pain intensity occurred immediately after treatment compared with preoperative pain ($P < 0.05$). With 5.25% NaOCl, a significant rise in pain intensity ($P < 0.05$) compared with preoperative pain occurred at three hours and continued through 24 hours ($P > 0.05$) and then a significant decrease occurred at 48 hours compared with the 24 hour level ($P < 0.05$), reaching the preoperative pain level ($P > 0.05$).

A gradual decrease compared with the preoperative pain then occurred up to seven days ($P < 0.05$); a significant rise, however, occurred after root filling compared with the seven days pain intensity ($P < 0.05$). A significant rise in pain intensity occurred with 1.3% NaOCl at three hours compared with immediately after treatment ($P < 0.05$), yet, it was significantly less than had been the pre-operative pain ($P < 0.05$).

Pain remained at the same intensity from three to 24 hours after which it gradually declined until it reduced at seven days compared with preoperative pain ($P < 0.05$) with no rise in pain level after root filling at seven days ($P > 0.05$).

Overall, postoperative pain incidence was significantly associated with preoperative pain ($P = 0.000$, OR [95% CI]: 1.788 [1.459, 2.192]), periapical radiolucency ($P = 0.015$, OR [95% CI]: 1.282 [1.049, 1.568] and analgesic intake ($P = 0.000$, OR [95% CI]: 2.477 [1.614, 3.803]; the other studied factors (gender, pain on percussion, sham intake) did not have an impact ($P > 0.05$).

A total of 60 of 308 patients (23/154 in the 1.3% NaOCl group and 37/154 in the 5.25% NaOCl group) took the sham capsule. A total of 38 of 308 (9/154 in the 1.3% NaOCl group and 29/154 in the 5.25% NaOCl group) patients took the analgesic (600 mg ibuprofen).

Thus, of the 60 patients who took the sham capsule, 22 (22/60, \approx 37%) patients did not require further analgesics. Using 1.3% NaOCl was associated with significantly less incidence of sham intake (23/154) compared with 5.25% NaOCl (37/154) (14.9% vs. 24%, respectively, $P=0.044$). There was also significantly less incidence of analgesic intake with 1.3% NaOCl (9/154) compared with 5.25% NaOCl (29/154) (5.8% vs. 18.8%, respectively, $P=0.001$).

For the 1.3% NaOCl group, overinstrumentation in a canal occurred in 12 cases, underinstrumentation in one case, overfilling in 10 cases and underfilling in one case. For the 5.25% NaOCl group, over instrumentation occurred in four cases, underinstrumentation in two cases, overfilling in four cases and underfilling in two cases. No instrument fractures occurred in either group. No adverse effects were recorded by any patient throughout the trial.

CONCLUSIONS

Using 1.3% NaOCl was associated with less intense and less frequent post-endodontic pain than that associated with 5.25% NaOCl in mandibular molars with non-vital pulps treated in two visits. The incidence of pain was reduced by up to 60% within the week post-instrumentation and 80% after root canal filling and the rescue analgesic intake reduced by about 70% when 1.3% NaOCl was used compared with the use of 5.25% NaOCl.

Implications for practice

This trial provides evidence of superior patient-related outcomes achieved using the 1.3% NaOCl as an irrigant compared to the 5.25% NaOCl.

Reference

1. Mostafa, MEHAA, El-Shrief, YAI, Anous, WIO, Hassan, MW, Salamah, FTA, El Boghdadi, RM, El-Bayoumi, MAA, Seyam, RM, Abd-El-Kader, KG, Amin, SAW. Postoperative pain following endodontic irrigation using 1.3% versus 5.25% sodium hypochlorite in mandibular molars with necrotic pulps: a randomized double-blind clinical trial. International Endodontic Journal 2020; 53: 154-66.

Do the CPD questionnaire on page 53

The Continuous 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.



Online CPD in 6 Easy Steps

- 1 Go to the SADA website www.sada.co.za.
- 2 Log into the 'member only' section with your unique SADA username and password.
- 3 Select the CPD navigation tab.
- 4 Select the questionnaire that you wish to complete.
- 5 Enter your multiple choice answers. Please note that you have two attempts to obtain at least 70%.
- 6 View and print your CPD certificate.