
Teeth in six hours

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The authors describe their own modification to a fixed mandibular prosthesis using Impladent implants. A temporary fixed bridge is made from the lower total prosthesis and fixed into the mouth using impression abutment coping. Patients are able to eat immediately. After six weeks the provisional bridge is replaced by the classical Brånemark bridge. Over a 30 month period, 92 patients were treated in this way - not a single implant was lost, giving a success rate of 100 % for this supraconstruction.

Introduction

The restoration of a mandibular occlusion using a conventional prosthesis is rarely successful. When the alveolar ridge is highly atrophied it becomes extremely difficult to fit a denture. In such cases implant surgery can offer an effective solution¹⁶. Two options are available: a hybrid prosthesis or a fixed bridge. In the first case, the prosthesis is connected to two or four implants via attachments; ball, bar-clip and magnet attachments are the most commonly used¹⁰. The limited long-term success of these implants, the frequent technical problems with attachments, and the frequent occurrence of other complications, has led us to abandon this type of treatment¹¹.

A fixed bridge offers the patient higher comfort, has a better performance for chewing and, in comparison with a hybrid prosthesis, is far more reliable. Its disadvantages are the higher cost, the extensive surgery and more demanding hygienic care required. Thus the need to develop a new procedure for the replacement of a mandibular occlusion that would be spared some or all of the above constraints and satisfy the following requirements:

- (1) acceptable price
- (2) suitable for a highly-atrophied alveolar ridge
- (3) short treatment time
- (4) easy hygiene care
- (5) minimally-invasive treatment
- (6) long-term success

Most of the above is offered by the bridge first presented by P.-I. Brånemark in 1965 and commonly known as the Brånemark bridge¹⁰. Traditionally, this bridge was fixed to implants that were already healed in, thus not complying with the above requirement for a short treatment time. However, there are published cases where immediate loading had been performed - but unfortunately then the cost of the treatment went up⁷.

In March 2004, the Implantology Department of the Dental Clinic in Hradec Králové (T. Vosáhlo) conceived the idea and developed a procedure that satisfied all the above stated criteria¹⁷. The preparation of the provisional bridge followed that of the earlier published methodology but this time included the use of the IMPLADENT implant system, allowing a reduction in the number of necessary components used. This approach proved to be decisive in satisfying the requirement of acceptable cost^{2, 3, 4, 5, 6, 7, 8}. This concept has been commercially presented as 'Teeth in six hours'.

The aim of this paper is to provide a description of the treatment protocol and an evaluation some two and half years after its first use.

Basic characteristics of the concept 'Teeth in six hours'

The concept 'Teeth in six hours' works with the Impladent implant system (Lasak Ltd.). It is based on inserting five Impladent STI-Bio-C implants (implants having a bioactive surface – Bio surface) with high primary stability in the interforaminal area^{12, 13, 14, 15}. Immediately the abutments for the screw-retained prosthesis are then attached. Using standard titanium impression coping that ensures not only a high mechanical strength but also the necessary passive accuracy, the provisional bridge is made from an existing total screw-retained prosthesis. Both the surgical and prosthetic phase need take no more than six hours. The provisional bridge allows for food to be taken immediately⁹. In patients with a partial denture, the remaining teeth are extracted directly prior to implant surgery and the supraconstruction made by completion of the partial prosthesis.

After implant osseointegration, the provisional bridge is replaced by a classical Brånemark bridge¹⁰. However its appearance is a unique and specific one, unlike any found among conventional prosthetics. It consists of a metal framework with long cantilevers leading to the first molar region. The metal framework is covered by pink resin and holds twelve prefabricated resin teeth.

Step-by-step procedure

1. application of antibiotics, local anaesthesia
2. if necessary, extraction of existing mandibular teeth, careful excochleation of walls and bottom of the extraction site
3. raising of mucoperiosteum of the alveolar ridge to the extent of 35–45
4. detection of both foramina mentalia
5. smoothing of alveolar ridge
6. localisation of suitable sites for implant placement; maintaining a regular interforaminal distance so that the gap between the end implant and foramen mentale is at least 3 mm

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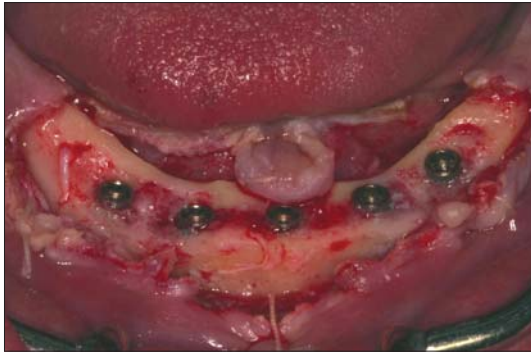


Fig. 1: Five Implants STI-Bio-C implants inserted in the interforaminal area

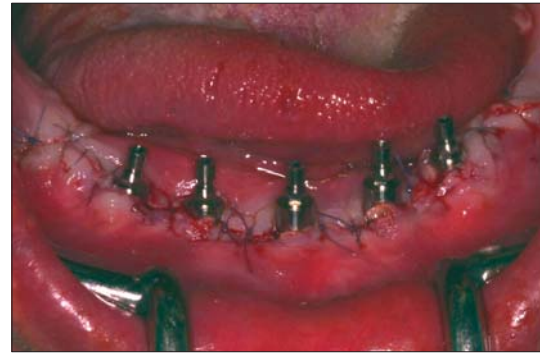


Fig. 2: The final surgical phase, abutments are ready for taking the impression

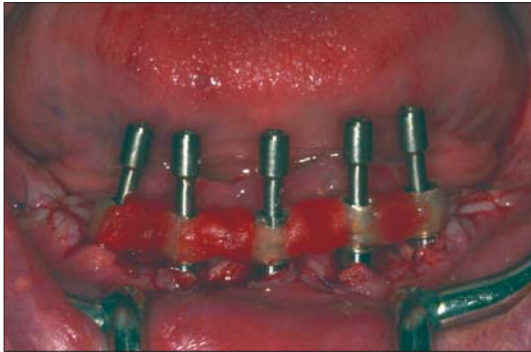


Fig. 3: Impression coping fixed with fastening screw and kept in blocks by self-polymerising resin



Fig. 4: Impression taken. A modified lower dental prosthesis is used instead of impression tray; impression copings become part of the impression



Fig. 5: Working model with impression coping and prepared prosthesis



Fig. 6: Temporary bridge made of prosthesis and impression coping ensuring passive fit

7. preparation of five bone beds for fixing Implants STI-Bio-C implants 3.7 mm in diameter and usually 16 mm in length (the implant length depends on the bone but the minimum length should be 10 mm)
8. implant insertion ensuring high primary stability (torque ≥ 45 Ncm, ISQ ≥ 60) (Fig. 1)
9. attachment of abutments for screw-retained supraconstruction (usually 4 mm long, depending on the width of soft tissue), torque 35 Ncm
10. suture using resorbable material (Fig. 2)
11. fixing of impression copings equipped with blocks of self-curing acrylic resin (PMMA)
12. impression copings equipped with blocks of self-curing acrylic resin (PMMA) are connected together using the same resin to form a rigid block (Fig. 3)
13. an impression is taken using A-silicon impression material and titanium impression copings; the recommended

- method is an open-tray impression technique but instead of an impression tray a modified lower dental prosthesis is used (Fig. 4)
14. a plaster working model with implant replicas is made
15. the working model prosthesis is extended using self-curing acrylic resin; impression copings become part of the prosthesis (Fig. 5)
16. transformation of the prosthesis into a fixed bridge by reducing it to 35 – 45 and by reducing the saddle
17. final preparation of the bridge (Fig. 6)
18. fixing of the provisional bridge to the implants using screws (15 Ncm) (Fig. 7)
19. checking the articulation
20. instructing the patient (use of antibiotics for another week, mouth rinsing with 0.12 % chlorhexidin), oral hygiene (the use of dental brush and intra-dental brush)
21. after six weeks the Brånemark bridge is made¹⁰ (Fig. 8)



Fig. 7: Temporary bridge fixed after six hours since the start of operation



Fig. 8: Brånemark bridge

Should a usable lower total prosthesis be unavailable, the bridge is fabricated *de novo* using basal resin. Although fixation of the impression coping remains the same, the relationships between the lower and upper jaw need to be reconstructed. Overall treatment time is thus increased from six to eight hours.

Results

The concept 'Teeth in six hours' was used by the authors in 92 patients between March 2004 and August 2006, 57 of which were male and 35 female. The average age of the patients was 62 years (range from 27 to 79 years of age). Contra-indications that might have an impact on the treatment success rate included diabetes mellitus in 13 patients (in four cases compensated by diet, in six cases by per oral application of antidiabetics, and in three cases by the application of insulin), and one patient suffering from kidney polycystitis that in a few weeks after treatment resulted in kidney failure. In a twenty-seven-year-old patient teeth loss was caused by ectodermal dysplasia.

Altogether 460 Impladent implants (Lasak Ltd., Prague) with bioactive surface Bio were inserted^{12, 13, 14, 15}, of which 410 implants were STI-Bio modified implants and 50 were of a newer type STI-Bio-C. The implant dimensions are given in Table 1. The height of the distant part of abutments for screw-retained supraconstruction is given in Table 2.

Tab. 1: Implant dimensions

diameter/length [mm]	8	10	12	14	16	18
3.7	0	7	18	54	367	8
5.0	0	0	0	2	4	0

Tab. 2: Height of the distant abutment part

Height [mm]	1	2	3	4	5	6
N	0	0	1	445	12	2

All surgeries were performed in out-patient care, in a dental chair, under local anaesthesia using Ubistesin F, and a prophylactic course of doxycyclin (Deoxymykoin tbl. 1x100 mg p.o.), or, in case of allergy of doxycyclin, clindamycin (Dalacin C cps. 3x300 mg p.o.). The application of antibiotics started one day before surgery and finished seven days after. The implants were surveyed over a period of 0 to 30 months, on average over 12.5 months: all implants and super-constructions were functional, i.e. survival rate was 100 %.

Discussion

The cost for the patient has been reduced by limiting the use of prosthetic components and by making a provisional bridge from the patient's existing total prosthesis and by manufacturing a Brånemark bridge with resin teeth as the final bridge¹⁰. The given data set, that includes all the implant treatments of the type performed at the authors' workplace, shows an extremely high success rate. It is expected that such a high success rate has been favoured by the rather high number of implant treatments included in this study compared to other documented procedures^{7, 8}. A statistical evaluation of the data set was performed only at the mid-term period. Considering that we have more than ten years experience and excellent results with conventional Brånemark bridges, we expect that the use of the same bridge type and the concept 'Teeth in six hours' will have similarly good results in the long term. This hypothesis, of course, will have to be confirmed by a long-term study.

A typical characteristic of the implants used was their Bio surface. It is a chemically-treated titanium surface that speeds up and enhances the process of osseointegration compared to other surface types^{12, 13, 14, 15}. The latest type of implant, STI-Bio-C, differs from its predecessor STI-Bio in having a cervical micro-thread, new thread design and a more-pronounced narrowing apex.

The concept of the Brånemark bridge that is characterised by its concentration of implants in the interforaminal area avoids the problem of the lack of alveolar bone which in the interforaminal area is almost always abundant and of high quality¹. The Brånemark bridge is particularly destined for older patients, often having lowered motor skills and thus having difficulties to maintain good oral hygiene. The design of the Brånemark bridge makes oral hygiene easier.

The treatment period is reduced to a minimum. The method of immediate loading is normally used in the case of the remaining teeth, immediate reconstruction after teeth extraction and immediate implant loading being performed¹⁰. From the patient's psychological point of view, it is also very important that the surgery brings results within a few hours rather than several months. In this way post-operative difficulties are easier to overcome too. The surgery is performed in an easily accessible area and is completed within 90 minutes of anaesthesia and with minimum trauma for the soft tissues. Neither sedation nor hospitalisation are necessary.

Literature

1. Brosky M.E., Koriath T.W.P., Hodges J.: The anterior cantilever in the implant-supported screw-retained mandibular prosthesis. *J. Prosthet. Dent.*, 89, 2003, 244–249.
2. Castellon P., Block M.S., Smith M.B., Finger I.M.: Immediate loading of the edentulous mandible: Delivery of the final restoration or a provisional restoration – which method to use? *J. Oral Maxillofac. Surg.*, Suppl., 62, 2004, 30–40.
3. Hatano N., Yamaguchi M., Suwa T., Watanabe K.: A modified method of immediate loading using Branemark implants in edentulous mandibles. *Odontology*, 91, 2003, 37–42.
4. Hatano N.: The Maxis New. A novel one-day technique for fixed individualized implant-supported prosthesis in the edentulous mandible using Branemark system implants. *Appl. Osseointegration Res.*, 2, 2001, 40–43.
5. ChanJin P., DongSuk K., YangJin Y., Lepra C.: Fabrication of a screw-retained, implant-supported, provisional prosthesis: a clinical report. *J. Prosthet. Dent.*, 91, 2004, 409–412.
6. Chow J., Hui E., Li D., Liu J.: Immediate loading of Branemark system fixtures in the mandible with a fixed provisional prosthesis. *Appl. Osseointegration Res.*, 2, 2001, 30–33.
7. Lekholm U.: Patient selection for Branemark Novum Treatment. *Appl. Osseointegration Res.*, 2, 2001, 36–39.
8. Maló P., Rangert B., Nobre M.: "All-on-four" immediate-function concept with Branemark system implants for completely edentulous mandibles: a retrospective clinical study. *Clin. Implant Dent. Relat. Res.*, Suppl., 5, 2003, 2–9.
9. Seydlová M., Havlová Z., Dostálová T., Nathanský Z., Šimůnek P.: Přímé zatížení implantátu (souborný referát). *Prakt. Zub. Lék.*, 52, 2004, 54–63.
10. Šimůnek A. a kol.: Dentální implantologie. *Nucleus HK*, Hradec Králové 2001.
11. Šimůnek A., Kopecká D., Krulichová I., Škrabková Z., Mounajjed R.: Pětileté sledování dentálních implantátů Implantent. *Quintessenz*, 10, 2001, 10: 20–25.
12. Šimůnek A., Strnad J., Kopecká D.: Stability time dependence of loaded and unloaded dental implants. *Clin. Oral Impl. Res.*, 16, 2005, XLI.
13. Šimůnek A., Strnad J., Novák J., Strnad Z., Kopecká D., Mounajjed R.: STI-Bio: titanium implant with bioactive surface design. *Clin. Oral Impl. Res.*, 12, 2001, 416.
14. Šimůnek A., Strnad J., Somanathan R.V., Kopecká S., Brázda T.: Stability-time dependence of unloaded dental implants. *Clin. Oral Impl. Res.*, 17, 2006, LXX.
15. Šimůnek A., Strnad J., Štěpánek A.: Bioactive titanium implants for shorter healing period. *Clin. Oral Impl. Res.*, 13, 2002, XXXIV.
16. Vaněk J., Bilder J., Prachár P., Freyburg L.: Dentální enosseální implantáty v rekonstrukci zubního oblouku. *Choroby hlavy a krku – head and neck diseases*, 7, 1998, 5–8.
17. Vosáhlo T., Šimůnek A., Kopecká D.: Rekonstrukce zubů dolní čelisti během šesti hodin. *LKS*, 15, 2005, 15–17.

Conclusions

'Teeth in six hours' represents the immediate replacement of the mandibular arch, using the Brånemark bridge with all its advantages. Clinical experience has shown that its success rate is very high. In our opinion its *cost-effectiveness* is the highest amongst the whole of implantology. The treatment is extremely fast and simple and the costs relatively low. Teeth replacement that can be completed within one day has a positive psychological impact on the patient, making the method highly attractive and, in addition, also raising the image of dental surgery.