Clinical, Socioeconomic and Patient Outcomes of Intensive Versus Conventional Scaling and Root Planing in the Treatment of Periodontal Infection

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Purpose: To compare the two non-surgical periodontal treatment methods with regard to socioeconomic aspects, treatment results and complications.

Methods and Results: Twenty-five patients were randomly divided into two groups for non-surgical treatment consisting of scaling and root planing. One group had intensive treatment (InT) performed within 24 h and the other group received conventional treatment (CoT) with one treatment session a week for 4 weeks. All the patients rinsed their mouth with chlorhexidine 0.2% after each treatment session for 5 weeks. The investigation before and after the treatment was performed by the same clinician blinded to the treatment modalities, and all the treatments were performed by the same dental hygienist. Treatment had significantly reduced the number of pockets in both the treatment groups, but there was no difference between the two treatment modalities regarding pocket reduction or reported discomfort/pain graded on the visual analogue scale. Only one patient receiving the InT was not satisfied. However, in the CoT group six patients answered that they would have preferred the InT, whereas the remaining patients answered that it did not matter whether they received InT or CoT. The patients in the CoT group consumed more analgesics after the treatment. The mean total travelling time for the InT group was 113 min compared with 357 min for the CoT group.

Conclusions: Most patients preferred the InT if they were to undergo the treatment again. Furthermore, InT resulted in a substantial socioeconomic gain with no difference in the treatment result and the complication rate compared with CoT.

Key words: full-mouth periodontal therapy, periodontal treatment, scaling and root planing

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Periodontitis is a chronic inflammatory disease affecting the tissue support of the teeth and if untreated will eventually lead to tooth loss. This disease has a multifactor aetiology with a prevalence of 10 to 13% in the population (Genco, 1996; Hugoson et al, 1998). Bacteria are important to initiate and to sustain the disease, but how the host's defence

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handles the bacterial challenge is what finally decides whether the disease will develop or not (Page et al, 1997). Important risk factors for periodontitis are smoking, some systemic diseases, heredity factors and stress (Genco, 1996; Bergstrom et al, 2000; Albandar, 2002; Wimmer et al, 2005). The final breakdown of the tissue around the tooth is caused by inflammation arising from the interaction between the products from the biofilm and the host's response. The clinical signs of periodontitis are bleeding on probing (BOP), deepened periodontal pockets and loss of clinical attachment (Theilade et al, 1966).

To treat periodontitis and to reduce the pocket depth, it is crucial to remove the subgingival biofilm and calculus by mechanical instrumentation of the root surface, a procedure called scaling and root

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planing (SRP) (Haffajee et al, 2003). This procedure is normally performed under local anaesthesia and is divided into four different occasions with one treatment session every week $(4 \times 1 h)$ and referred to as conventional treatment (CoT). A number of studies have shown that SRP with CoT significantly reduces the number of diseased pockets (Badersten et al, 1984a, b; Matthews, 2005). In other studies, even better treatment results have been achieved by carrying out the treatment on two occasions within 24 h, here referred to as intensive treatment (InT) (Quirynen et al, 2000). Complications such as pain, soreness, aching, pus and even periodontal abscess can occur after SRP, independent of the method used (Pihlstrom et al, 1999; van Steenberghe et al, 2004). Slightly more discomfort/pain during and after the treatment has been reported for the intensive method (Quirynen et al, 2000; Apatzidou and Kinane, 2004).

A comparison between the two treatment methods with regard to patient preference and socioeconomic aspects has not yet been undertaken.

The aim of the present study was to investigate if there are any differences between CoT and InT regarding (i) which method the patients preferred, and complications in terms of pain, tenderness and swelling; (ii) differences in the results of the treatment; and (iii) socioeconomic differences in terms of sick leave or absence from work.

METHODS

During a period of 24 months, patients who were referred for periodontal treatment to the Department of Periodontology in Gävle County Hospital in Sweden were invited to participate in the study. Patients who had a pocket depth of \geq 5 mm in at least four teeth in each quadrant with ongoing inflammation were considered to be eligible for the study. Patients were excluded if they had any systemic disease or had taken antibiotics within 3 months either before the treatment or during the follow-up period until the evaluation was completed.

A total of 27 patients (14 women and 13 men) were included in the study. Consecutive patients were randomly divided into two groups, CoT and InT, based on different stratification criteria. These criteria were: male/female, smoker/non-smoker, short/long travel distance and Swedish National Dental Index (SNDI) > 25/< 25. The SNDI is derived from Hugoson and Jordan's (1982) method of measuring the loss of bone, that is mainly based on alveolar bone loss



measured on radiographs. Due to the large recruitment area of the department, a short travelling distance was defined as 50 km or less. Randomisation (minimisation method) by an independent statistician was used to allocate the patients into respective treatment groups (Altman, 1999).

The clinical examination included assessment for all the teeth present regarding surfaces with the presence or the absence of Plaque Index (PLI), BOP and deepened periodontal pockets. Probing depth was measured (mesiobuccal, midbuccal, distobuccal, mesiolingual, midlingual and distolingual) using a UNC 12 manual probe (Hu-Friedy, IL, USA) and the four deepest sites for each tooth were registered. Deepened pockets (> 4 mm) were registered in two categories: those with a depth of 5 to 6 mm and those with a depth of \geq 7 mm. The same clinician, who was blinded to the type of treatment method used, performed the clinical examination before and 8 weeks after the last treatment session.

All patients received standard oral hygiene instructions before the first session of SRP. To optimise the plaque control, the patients were instructed to rinse their mouth with 10 ml of chlorhexidine gluconate 0.2% aqueous solution (Hexident[®] Sweden) for 1 full minute twice a day for 5 weeks.

The SRP sessions were performed by the same dental hygienist using periodontal curettes (LM, Finland) and ultrasonic scaler (AMDENT, Sweden). All treatments were performed under local anaesthesia with 2% Xylocain–Adrenalin[®] (AstraZeneca, Sweden). In the CoT group, SRP sessions were performed in quadrants. One quadrant a week was treated during a total period of 4 weeks $(4 \times 1 h)$ in contrast with the InT group, where all the treatments were performed on two occasions $(2 \times 2 h)$ within 24 h. The cost and treatment time were the same for both the treatment methods. At the completion of evaluation, 8 weeks after the last treatment session, the patients were given a questionnaire that they answered on the spot. The questionnaire concerned their direct experience of the treatment, problems that may have arisen after the treatment and how much time they had to put aside for the treatment including the travelling time. The patients graded discomfort/pain during the treatment session on a 100-mm horizontal visual analogue scale (VAS) (Katz and Melzack, 1999). The cross mark placed by the patient was scored to the nearest millimetre, resulting in a score between 0 (no pain) and 100 (extreme pain). Two patients, one in each group, did not complete the follow-up. All patients gave their informed consent and the study was approved by the Regional Ethics Committee.

Table 1 Basic characteristics and measurements in the study population. Mean values are given as ± SD					
	InT (n = 12)	CoT (n = 13)	P value		
Women	6	8			
Men	6	5			
SNDI	24.3 ± 3.1	26.5 ± 4.0	0.138		
Age (years)	49.7 (r = 37–72)	50.4 (r = 41–58)	0.638		
Smokers	8	9	0.891		
Travel distance > 50 km	10	10	0.689		
Pocket depth \geq 5 mm	43.7 ± 14.3	41.7 ± 11.4	0.686		

Table 2 Mean pocket depth and the number of pockets with a depth of 5–6 mm and \geq 7 mm, before and after

Pocket depth	_	InT (n = 12)					CoT (n = 13)			
	Before		After			Before		After		
	n	Mean ± SD	n	Mean ± SD	P value	n	Mean ± SD	n	Mean ± SD	P value
5–6 mm	400	33.3 ± 11.2	153	14.3 ± 12.1	< 0.001	436	33.5 ± 9.4	148	11.5 ± 7.2	< 0.001
\geq 7 mm	130	10.8 ± 7.5	30	2.5 ± 3.3	< 0.001	122	9.4 ± 5.2	11	0.9 ± 1.7	< 0.001
Mean pocket depth		4.24 ± 0.46		3.55 ± 0.38	< 0.003		4.2 ± 0.35		3.44 ± 0.31	< 0.003

Statistical analysis

Measurements are described using summary statistics such as mean, proportion and range. In the analysis, chi-square tests for differences in proportions were used. When testing for differences in mean values between groups with normally distributed data, paired sample *t* test and analysis of variance (ANOVA) for repeated measurements were used. Differences in mean values between groups with non-normally distributed data were tested with the Wilcoxon signed rank test. To analyse the patients' experience of discomfort/pain on an ordinal scale, VAS, Mann–Whitney *U* test was used. Two-tailed significance values with P < 0.05 were regarded as significant. SPSS for Windows, version 13.0 was used for data handling and analysis.

RESULTS

A total of 25 patients completed the treatment and the follow-up: 13 in the CoT group and 12 in the InT group. All participants answered the questionnaire at the follow-up, 8 weeks after the last treatment. No significant differences were seen between the different treatment groups regarding basic characteristics (Table 1).

The number of pockets, 5 to 6 mm and \geq 7 mm deep, as well as mean pocket depth was significantly reduced after the treatment in both the InT and CoT groups, but there was no significant difference between the two treatment groups regarding the reduction (Table 2).

One patient in each group was not examined with regard to PLI. Of those who were examined, all patients in the InT group and 11 of 12 in the CoT group had plaque at the time of clinical examination. After treatment, there was a significant reduction in the number of surfaces with plaque in both the groups (P = 0.004 for InT and P = 0.001 for CoT).

Prior to treatment, all patients in both the groups had BOP on almost half of the teeth surfaces and after treatment this was significantly reduced for both the groups (P < 0.001). There was no difference between the two groups concerning BOP after treatment. The percentage of teeth surfaces with BOP and PLI before and after treatment is presented in Table 3.

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	InT (n = 12)			CoT (r	Scont	
	Before	After	P value	Before	After	P value
PLI*	43.0%	17.1%	0.004	45.8%	20.4%	0.001
BOP	35.8%	10.6%	< 0.001	50.9%	12.4%	< 0.001

Discomfort/pain under treatment

The mean value of discomfort/pain under the treatment sessions, graded on the VAS, was 32.3 in the InT group and 25 in the CoT group. The difference was not statistically significant (P = 0.45).

Post-treatment complications

A total of six patients in the InT group and eight in the CoT group had at least one complication: tenderness, fever and swelling. Three of the patients in the InT group experienced swelling and six had tenderness. In the CoT group, one patient experienced fever and seven experienced tenderness after treatment. Two patients in the InT group compared with six in the CoT group used analgesics after treatment, but no patients took analgesics for more than 2 days. A statistical comparison was not performed due to the minimal number of complications.

Sick leave

Of the 25 patients who took part in the study, 24 were employed and none of them took sick leave after the treatment. The remaining patient had retired and did not respond to the question about sick leave.

Travelling time

The patients in the InT group only had to travel two times for treatment compared with four times for the patients in the CoT group. Ten patients in each group had a travel distance of < 50 km. The mean total travelling time for the InT group was 113 min compared with 357 min for the CoT group.

Satisfaction

The last question on the questionnaire concerned the patient's satisfaction with the treatment they received. In the InT group, 11 of the 12 patients reported that they were satisfied with two sessions, and the remaining one patient answered that it did not matter. In the CoT group, four patients were satisfied with four sessions, six reported that they would have preferred the two-session treatment, whereas the remaining three patients answered that it did not matter if there were two or four treatment sessions.

Comments

Five of the twelve patients in the InT group commented that they preferred the InT because of the time reduction. To undergo the anaesthetic procedure on only two occasions instead of four was the reason for another patient who preferred the InT. The remaining six patients did not give a reason why they preferred the InT. In the CoT group, six patients preferred the InT treatment and five of those six patients mentioned 'absence from work', 'travelling time' or 'number of occasions for anaesthesia' as the reason for their choice. One patient believed the InT to be 'more effective'. Of those who preferred the CoT one mentioned their 'work situation' as the reason and another patient said that she needed time between the treatment sessions to rest. The remaining five patients in the CoT group did not provide any comment.

DISCUSSION

In the present study, there was a significant reduction, independent of the treatment method, of pocket depth, PLI and BOP, but there was no significant difference in these clinical parameters between the treatment groups. These findings are in line with the findings of Apatzidou and Kinane (2004). Other studies, however, have reported significantly greater improvement for the abovementioned parameters in the InT group when compared with the CoT group (Mongardini et al, 1999; Quirynen et al, 2000). An explanation for these differences regarding the treatment result may be that in the latter studies, only patients in the InT group received chlorhexidine (Quirynen et al, 1995; Vandekerckhove et al, 1996; Bollen et al, 1998; Mongardini et al, 1999; Quirynen et al, 2000). It is well known that chlorhexidine significantly improves the effect of normal mechanical oral hygiene procedures (Sharma et al, 2003).

Discomfort and pain

The patients in the InT group reported a marginally higher score for discomfort/pain on a VAS regarding the treatment sessions, but no significant difference between the two treatment groups was seen. Apatzidou, however, had found a significantly higher pain rating in the InT group (Apatzidou and Kinane, 2004). In the present study, the questionnaire was given to the patients 8 weeks after the last treatment session, in contrast to Apatzidou's study where they received the questionnaire 1 or 2 days after the treatment. The time that elapsed between treatment sessions and the questionnaire probably influenced the patients' memory of discomfort and pain, and this could be an explanation for the difference between the two studies.

Post-treatment complication

Pain during, as well as after, treatment with SRP has been reported in several studies (Mongardini et al, 1999; Pihlstrom et al, 1999; Quirynen et al, 1999; Apatzidou and Kinane, 2004; van Steenberghe et al, 2004). Furthermore, in a recent study it has been reported by Tonetti and co-workers that InT resulted in a transient systemic inflammatory response and also in a transient impairment of endothelial function. These findings indicate that local periodontal treatment can evoke a systemic effect (Tonetti et al, 2007). In the present study, 46% of the patients in the CoT group and 17% in the InT group used analgesics after treatment. This is in contrast with the findings of Apatzidou and co-workers who found significantly higher intake of analgesics in the InT group compared with that in the CoT



group (Quirynen et al, 1999). The occasion on which the questionnaire was administered can also be an explanation for these differences. In the Apatzidou and Kinane study, the questionnaire was given after the first treatment session, so in that study there is no data on analgesic use for the CoT group after the remaining three treatment sessions. Another difference between the studies is that in the present study the InT was divided into 2 days instead of one and this might have influenced the sensation of pain and discomfort. In the present study, only one patient from the CoT group reported fever. No other discomfort such as oral ulceration and herpes labialis was seen in this study, and this is in line with the findings of Quirynen et al (2000).

Socioeconomic aspects (leave of absence and travelling time)

The socioeconomic aspects of different treatment strategies are rarely studied. In this study, it was shown that by receiving the InT, patients saved on time needed to travel and were absent from work less often without treatment results being affected.

Preference/comments

In the present study, there was a significant preference for the InT among the patients. Fifteen patients (60%) preferred the InT and only four patients (16%) in this study preferred the CoT. Some of the most common comments as to why the patients preferred the InT were that they wanted to have the treatment done as quickly as possible, they received local anaesthetic on only two occasions instead of four, and they were less often absent from work and had less travelling time.

Comments on work environmental aspects

The InT could be regarded as more demanding for both the patient and the clinician, as the treatment session on each occasion is extended for a longer period of time. Therefore, it is important to take a break in the middle of the treatment session for both the patient and the clinician. However, there are also advantages with longer treatment sessions: the patients will have more time at their disposal and as per the authors' opinion this makes the treatment less stressful with InT. To really explore the working environmental advantages and the drawbacks with

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InT versus CoT, studies designed to answer that question need to be done.

CONCLUSIONS

This study shows that InT is well tolerated by systemically healthy patients and achieves the same treatment results as the CoT method. The greatest benefits with InT seem to be the reduced number of treatment visits for patients and gains in socioeconomic aspects such as less travelling time and less absence from work. This treatment method should be limited to systemic healthy individuals as it is not known how patients with systemic disease will react to this treatment. The effect that the physical strain will have on the clinician is not known and needs to be investigated in future studies.

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