Journal of Oral Science, Vol. 47, No. 3, 159-164, 2005

Case report

Periodic exacerbation of gingival inflammation during the menstrual cycle

Nobuko Koreeda[1)], Yoshihiro Iwano[1)], Mamoru Kishida[1)], Ayako Otsuka[2)], Aki Kawamoto[2)], Naoyuki Sugano[1,3)] and Koichi Ito[1,3)]

[1)]Department of Periodontology, Nihon University School of Dentistry, Tokyo, Japan
[2)]Dental Hygienist Section, Nihon University Dental Hospital, Tokyo, Japan
[3)]Division of Advanced Dental Treatment, Dental Research Center, Nihon University School of Dentistry, Tokyo, Japan

(Received 16 August and accepted 12 September 2005)

Abstract: Sex hormones are believed to be a risk factor for periodontitis because of their ability to proliferate specific periodontal microorganisms and affect host immunologic response. In this case report, gingival redness and swelling occurred during the menstrual cycle, although the patient maintained good oral hygiene during periodontal treatment. Medical history revealed that exacerbation of gingival inflammation corresponded to the menstrual cycle and occurred during the ovulation period, when estrogen levels are high. Mean bleeding index of the ovulation period (18.9%) showed higher levels than that during the menstrual phase (5.3%). This case indicates that frequent and effective maintenance should be provided while considering the influence of the menstrual cycle, as sex hormones may be involved in exacerbating gingival inflammation. (J. Oral Sci. 47, 159-164, 2005)

Keywords: menstrual cycle; estrogen; adult periodontitis; bleeding index.

Introduction

Periodontal disease is an infectious illness caused by periodontal pathogens. Onset and progression of periodontitis vary in patients, being dependent on host and environmental factors. Increased sex hormone secretion is considered a host risk factor. In addition, several reports have indicated that sex hormones induce proliferation of specific periodontal microorganisms (1-3) and affect host immunologic response (4-6). In particular, it is reported that gingival inflammation deteriorates at the time of conception, when sex hormones are elevated and positive control of periodontal pathogens is vital (7,8). In this report, we describe a case of periodontitis with a history of endometriosis and hysteromyoma caused by increased sex hormones, and exacerbation of gingival inflammation occurring within a cycle, despite the patient maintaining good oral hygiene following periodontal treatment.

Correspondence to Dr. Yoshihiro Iwano, Department of Periodontology, Nihon University School of Dentistry, 1-8-13 Kanda-Surugadai, Chiyoda-ku, Tokyo 101-8310, Japan
Tel: +81-3-3219-8107
Fax: +81-3-3219-8349
E-mail: iwano@dent.nihon-u.ac.jp

Case

A 35-year-old woman visited the Department of Periodontology at Nihon University Dental Hospital, Japan, with the chief complaint of gingival swelling and pain around the mandibular molar region on July 27, 2004.

Medical history

The patient had suffered from endometriosis and hysteromyoma for 10 years. Because of the exacerbation of symptoms, she underwent surgery to remove hysteromyoma in 2004. To compensate for the reduced secretion of estrogen and progesterone, she received SUPRECURE® gonadotropin-releasing hormone derivative preparation both pre- and post-operatively. She was making satisfactory progress, and stopped taking medication at 10 weeks post-surgery. During the administration period, menstruation was disrupted, but slowly recovered.

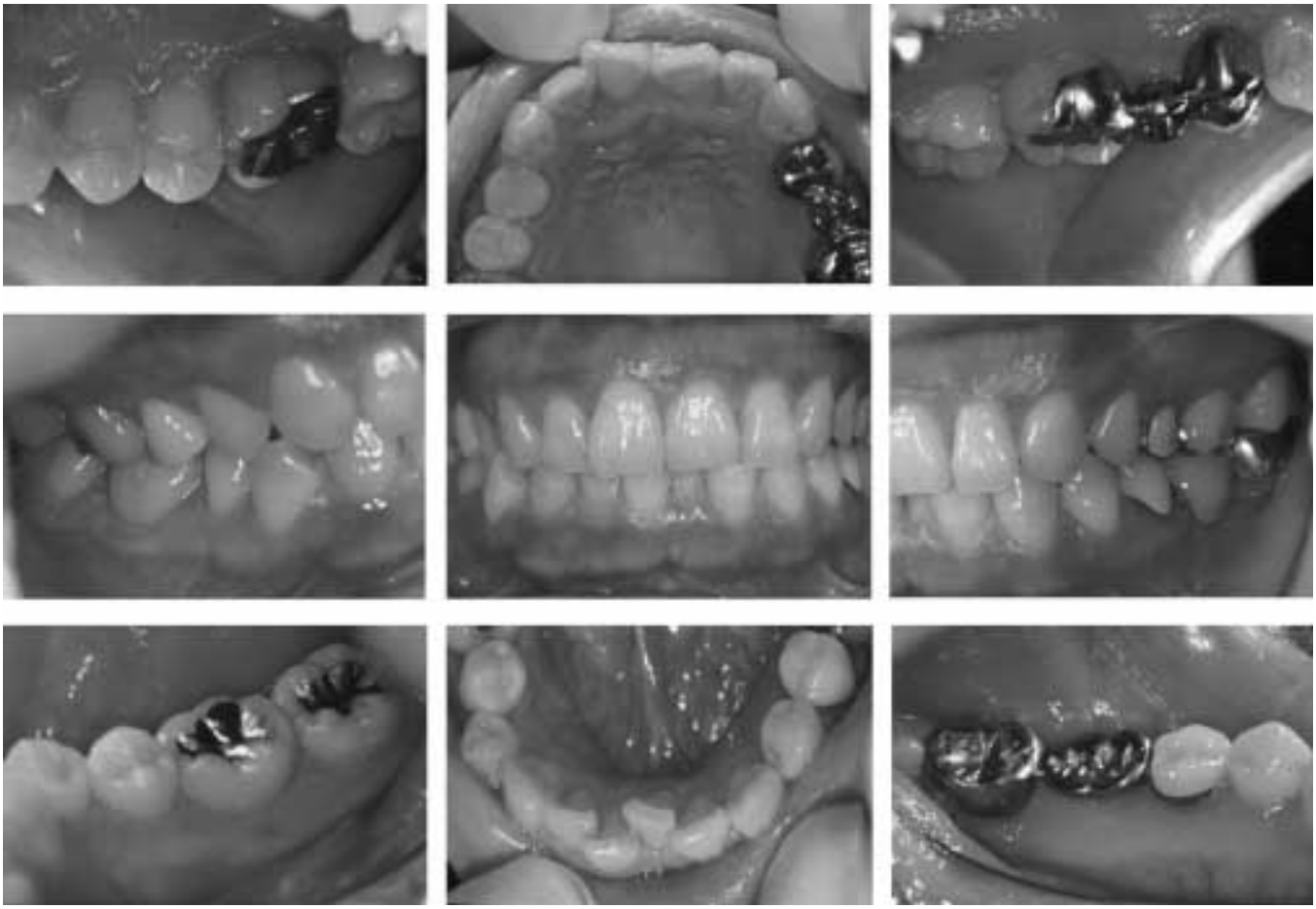


Fig. 1 Clinical photographs at initial visit.

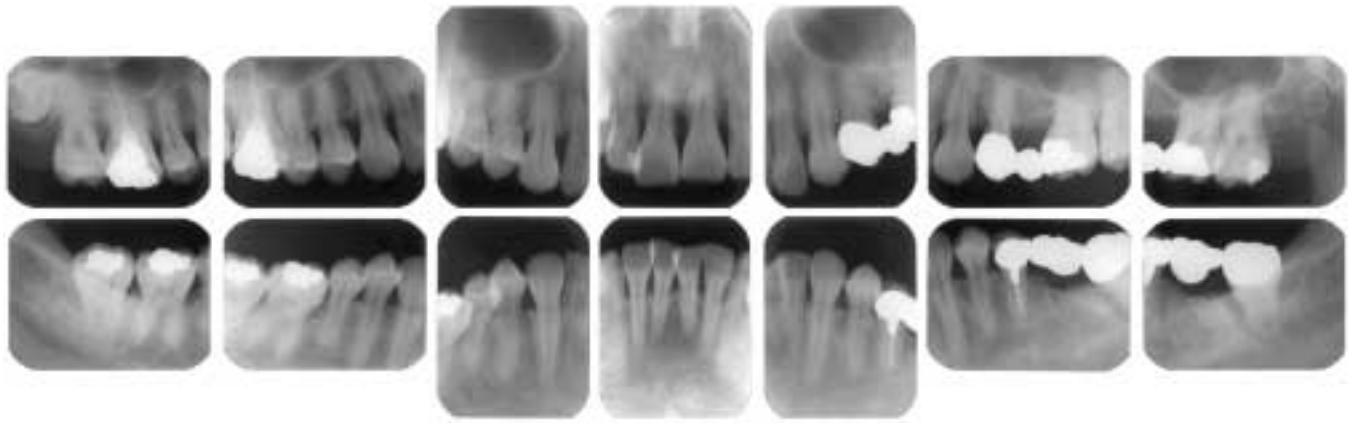


Fig. 2 Radiographs at initial visit.

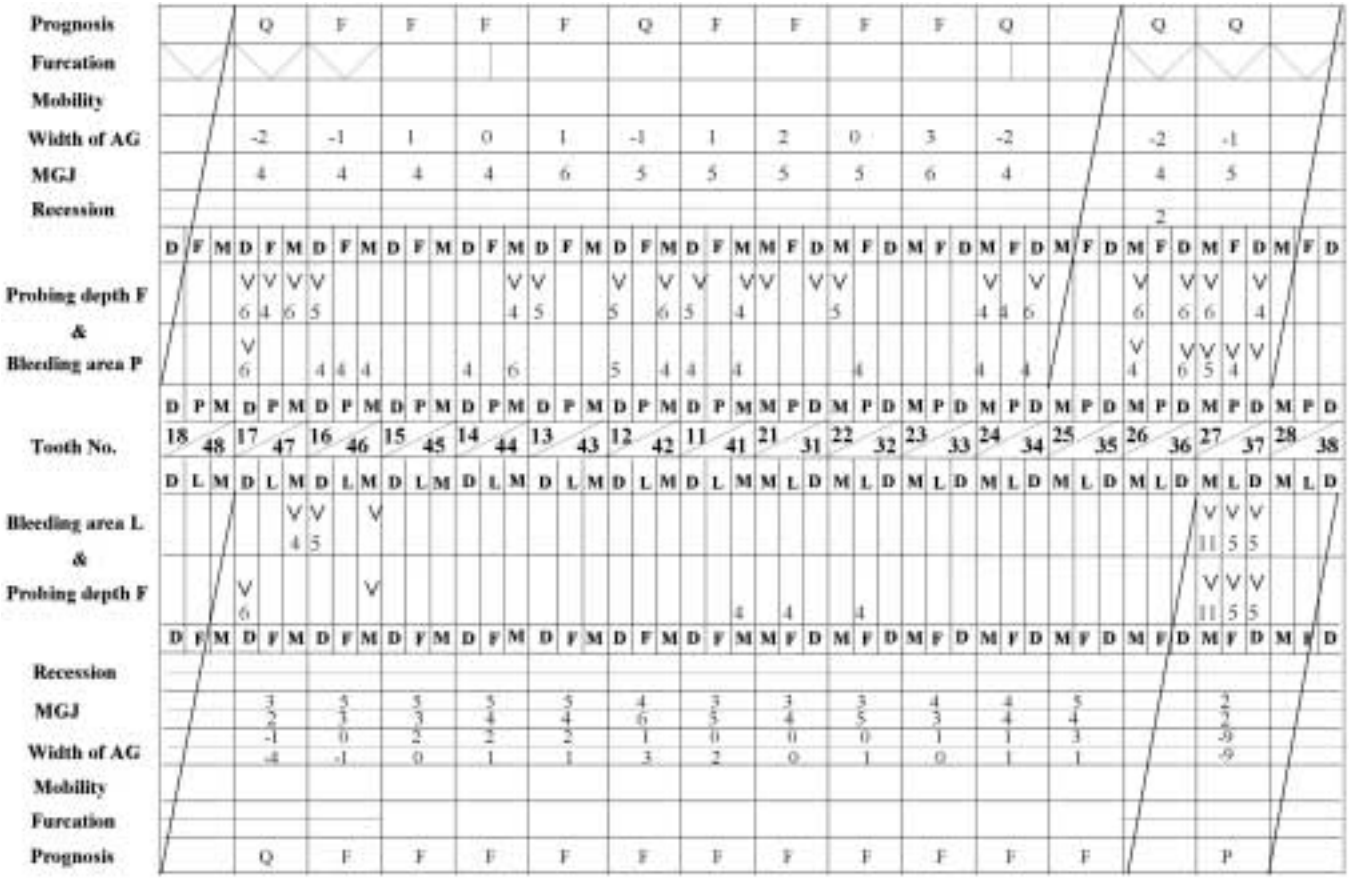
Intra oral findings

Clinical photographs at initial visit are shown in Fig. 1. Generalized redness and gingival swelling are seen. In particular, pus discharge was observed near the lower posterior tooth. Crowding and gingival inflammation were also seen near the upper and lower anterior teeth. Open margin of crown prosthesis was seen in the upper and lower posterior regions, and plaque adhesion was seen on the pontic. However, there was no indication of bruxism or cuspal interference.

Clinical findings

Periodontal charting at initial visit is shown in Table 1 (probing depth < 3 mm omitted). Initial clinical evaluation revealed a mean probing depth of 3.46 mm; probing depth was 6 mm in the area of the maxillary posterior tooth and

Table 1 Periodontal charting at initial visit



11 mm in the area of the mandibular left second molar. Mean bleeding index was 49%, and was particularly pronounced in the area of the maxillary teeth. Tooth mobility was not noted.

Radiographic findings

Figure 2 shows the radiographs at initial visit. Horizontal bone loss was evident around all teeth. In the maxilla, anterior teeth showed three-walled vertical bony defects and the left second molar showed the second part of a vertical bony defect. The mandibular left second molar showed extensive vertical bony defects penetrating to the root apex.

Diagnosis

Moderate periodontitis and severe localized periodontitis

Treatment process

The initial phase of treatment consisted of oral hygiene instruction, full mouth scaling and root debridement for all periodontal pockets. Treatment of caries and endodontic lesions, and provisional replacement of restorations were also performed as part of the initial therapy. At completion of the initial therapy, re-evaluation was performed (Fig. 3 and 4, Table 2). Plaque score decreased from 74% to 15.4%, mean probing depth from 3.46 mm to 3.23 mm and bleeding index from 49% to 1.3% after initial treatment. After re-evaluation of periodontium, periodontal reconstructive surgery with enamel matrix derivative was carried out at the mandibular left second molar and post-operative course remains good.

Periodic exacerbation of gingival inflammation during the menstrual cycle

Gingival redness and swelling occurred in a cycle, despite the patient maintaining good oral hygiene during periodontal treatment. The medical history confirmed that exacerbation of gingival inflammation corresponded to the menstrual cycle and this occurred during the ovulation period, when estrogen secretion is high. Examination of gingival inflammation over a 17-month period after initial periodontal treatment revealed that mean bleeding index during the ovulatory period (18.9%: n = 5) was higher than that during the menstrual phase (5.3%: n = 4). Figure 5 and 6 show typical examples of bleeding on probing during the ovulatory and menstrual phases, respectively.

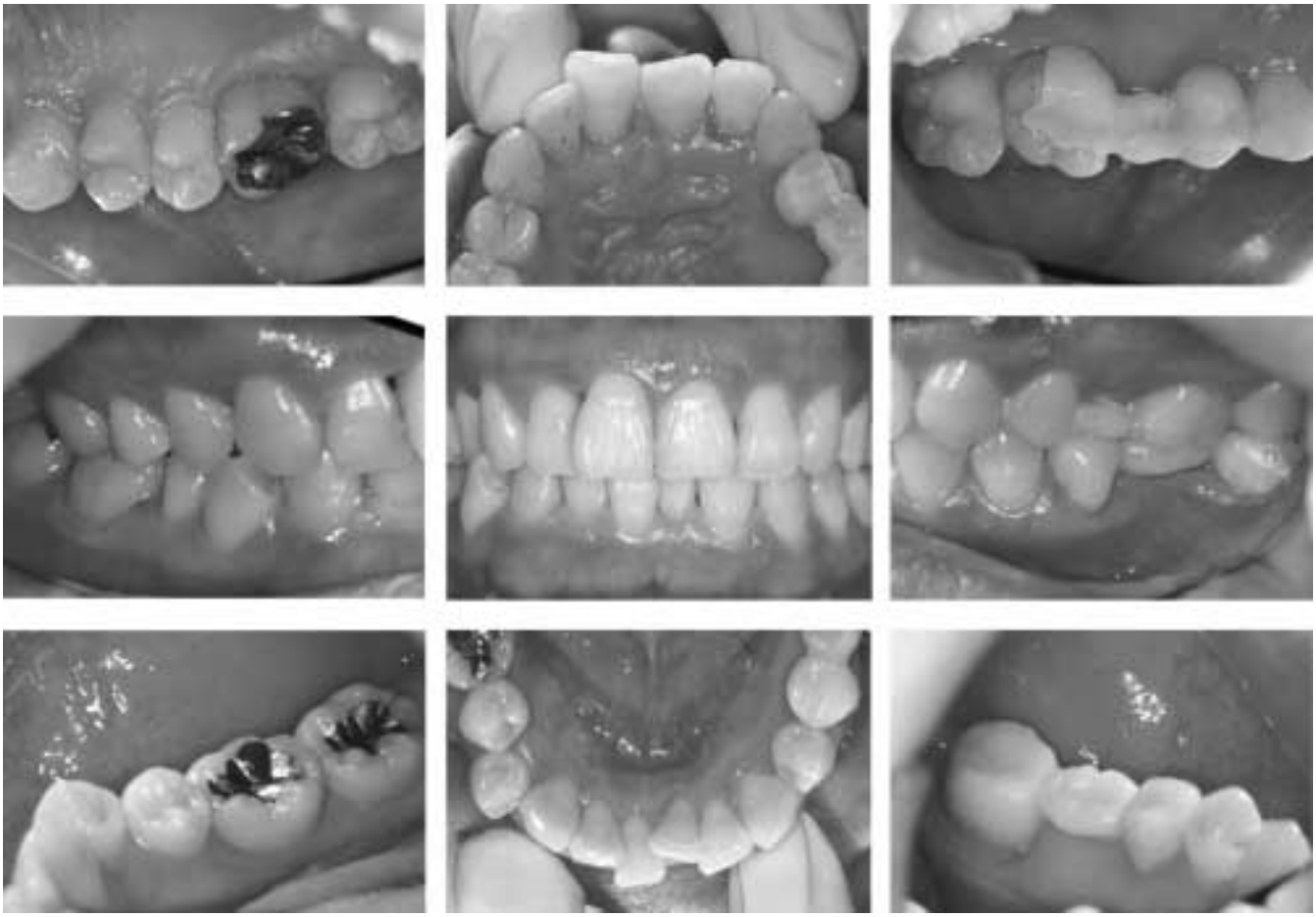


Fig. 3 Clinical photographs at re-evaluation.

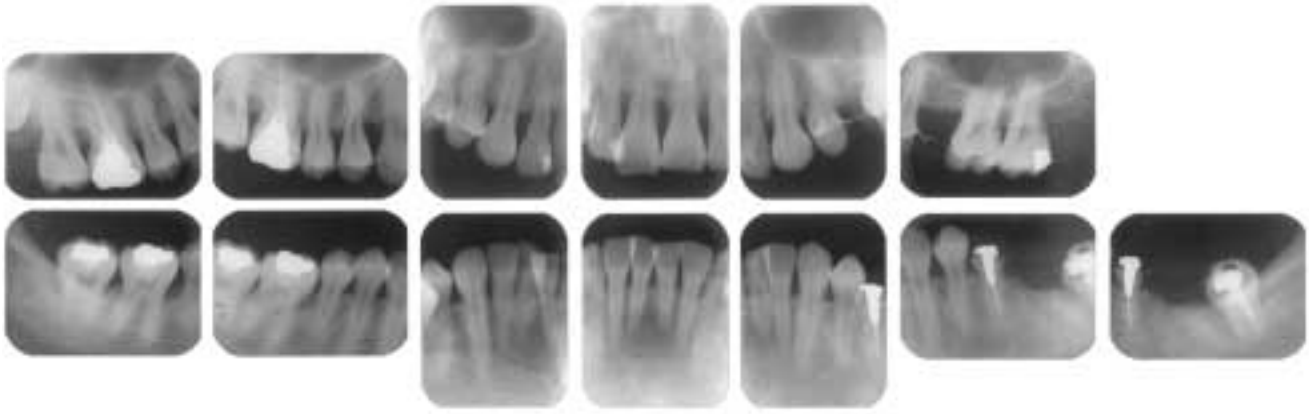


Fig. 4 Radiographs at re-evaluation.

Discussion

The main sex hormones exerting influence on the periodontium are estrogens and progestins. The principal premenopausal estrogen is estradiol, whereas the main postmenstrual estrogen is estrone, which does not demonstrate cyclic changes (9). In addition, the principal female progestin is progesterone.

It has been reported that increased sex hormone levels induce increases in the number of anaerobes, such as *Prevotella intermedia* (1-3), and have an effect on onset and progression of periodontitis by decreasing the phagocytic capacity of polymorphonuclear leucocytes (PMNs), while increasing the release of interleukin-1ß (8). In addition, sex hormones increase vascular permeability and enhance proteolytic enzyme interaction with interleukin-6, an inflammation mediator (10,11).

We performed periodic evaluation after initial preparation. The patient maintained good oral hygiene

Table 2 Periodontal charting at re-evaluation

	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
Prognosis		Q	F	G	F	F	Q	F	F	G	G	F		Q	F	
Furcation																
Mobility																
Width of AG		0	1	1	0	2	1	2	2	2	3	1		0	1	
MGJ		4	4	4	4	6	5	5	5	5	6	4		4	5	
Recession		2					1							2		
Sites	D F M	D F M	D F M	D F M	D F M	D F M	D F M	D F M	M F D	M F D	M F D	M F D	M F D	M F D	M F D	M F D
Probing depth F		F: 4			M: 4	M: 4	D: 4							M: 4, D: 4		
Bleeding area P		D: V 6	D: 4				D: 4							D: 4	D: 4	
Sites	D P M	D P M	D P M	D P M	D P M	D P M	D P M	D P M	M P D	M P D	M P D	M P D	M P D	M P D	M P D	M P D
Tooth No.	18/48	17/47	16/46	15/45	14/44	13/43	12/42	11/41	21/31	22/32	23/33	24/34	25/35	26/36	27/37	28/38
Sites	D L M	D L M	D L M	D L M	D L M	D L M	D L M	D L M	M L D	M L D	M L D	M L D	M L D	M L D	M L D	M L D
Bleeding area L		M: 4	D: 4												M: 8	
Probing depth F		D: 5													M: 8	
Sites	D F M	D F M	D F M	D F M	D F M	D F M	D F M	D F M	M F D	M F D	M F D	M F D	M F D	M F D	M F D	M F D
Recession		1													2, 2	
MGJ		3, 2	5, 3	5, 3	5, 4	5, 4	4, 6	3, 5	3, 4	3, 5	4, 3	4, 4	5, 4		2, 2	
Width of AG		-1, -3	1, 0	2, 0	2, 1	2, 1	1, 3	0, 2	0, 1	0, 2	1, 0	1, 1	2, 1		-6, -6	
Mobility																
Furcation																
Prognosis		Q	F	F	G	G	G	G	G	G	G	G	G		P	

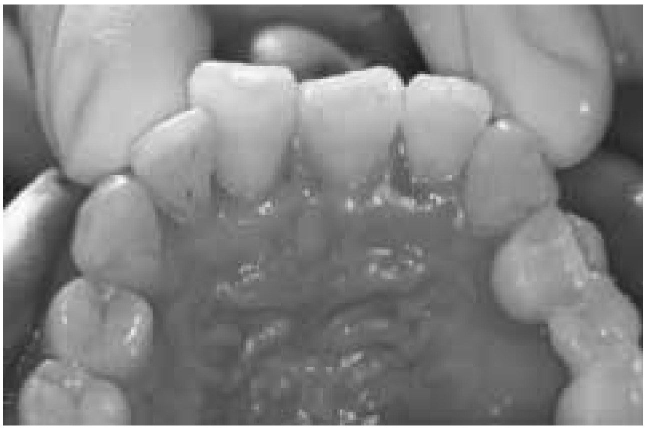


Fig. 5 Typical examples of bleeding on probing during the ovulatory phase.

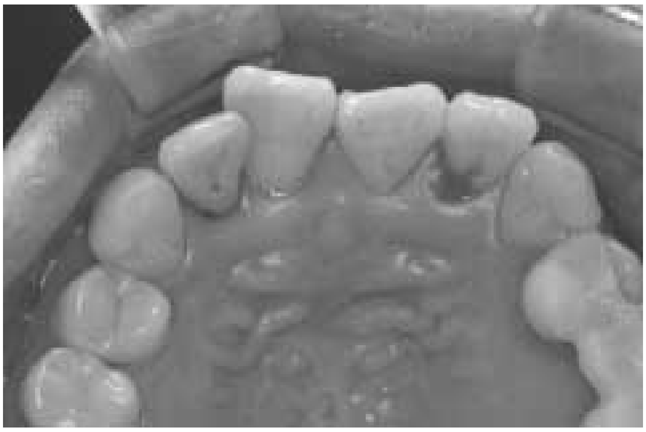


Fig. 6 Typical examples of bleeding on probing during the menstrual phase.

and clinical conditions changed for the better after initial treatment; however, severe gingival inflammation occurred during the ovulation period, during which estrogen secretion was high when compared with the menstrual phase. In addition, exacerbation of gingival inflammation corresponding to the menstrual cycle was observed. We observed that the mean bleeding index during the ovulatory period was higher than that during the menstrual phase. Generally, severity of gingival inflammation is correlated with plaque volume and better gingival conditions and oral hygiene instruction results in decreased plaque volume.

Tsuji (12) reported that the amount of Estradiol-17ß in Gingival Crevicular Fluid was positively correlated with severity of probing depth, gingival index and gingival bleeding index. Miyagi et al. (13) suggested that sex hormones have different effects on PMN migration;

progesterone enhances migration and estradiol reduces migration. Moreover, several articles have suggested correlations with the menstrual cycle; during the ovulatory phase, gingival inflammation index increases, although no significant change in plaque index was detected (14-18). The daily estrogen secretion rate in healthy Japanese women is lower during the menstrual period (11–82 pg/ml) than the ovulatory period (120–390 pg/ml). The periodic exacerbation of gingival inflammation during the menstrual cycle in this case might have been caused by increased sex hormone levels during the ovulatory phase.

There are substantial differences between individuals with regard to host factors, including sex hormones, that are implicated in the onset and progression of periodontitis. Therefore, the clinical practitioner should be conscious of the menstrual cycle. Although the relationship between sex hormones and periodontium requires further clarification, frequent and effective maintenance should be provided, while considering that changes in sex hormone levels during the menstrual cycle have an effect on gingival inflammation.

References

1. Kornman KS, Loesche WJ (1980) The subgingival microbial flora during pregnancy. J Periodontal Res 15, 111-122
2. Jensen J, Liljemark W, Bloomquist C (1981) The effect of female sex hormones on subgngival plaque. J Periodontol 52, 599-602
3. Raber-Durlacher JE, van Steenbergen TJM, van der Velden U, de Graaff J, Abraham-Inpijn L (1994) Experimental gingivitis during pregnancy and post-partum: clinical, endocrinological, and microbiological aspects. J Clin Periodontol 21, 549-558
4. ElAttar TMA (1976) Prostaglandin E_2 in human gingiva in health and disease and its stimulation by female sex steroids. Prostaglandins 11, 331-341
5. Ferris GM (1993) Alteration in female sex hormones: their effect on oral tissues and dental treatment. Compendium 14, 1558-1564, 1566-1570
6. Miyagi M, Aoyama H, Morishita M, Iwamoto Y (1992) Effects of sex hormones on chemotaxis of human peripheral polymorphonuclear leukocytes and monocytes. J Periodontol 63, 28-32
7. Murayama Y, Nishimura F, Iwamoto Y, Takashiba S (2003) Periodontitis and systematic disease –on the basis of periodontitis pathogenesis–. Nippon Shishubyo Gakkai Kaishi 45, 325-348 (in Japanese)
8. Kanda M, Ogawa T, Kamoi K (2002) Effect of sex hormone on polymorphonuclear leukocyte functions of periodontal tissue. Nippon Shishubyo Gakkai Kaishi 44, 366-375 (in Japanese)
9. Yen SS (1977) The biology of menopause. J Reprod Med 18, 287-296
10. Lapp CA, Thomas ME, Lewis JB (1995) Modulation by progesterone of interleukin-6 production by gingival fibroblasts. J Periodontol 66, 279-284
11. Kinane DF, Podmore M, Murray MC, Hodge PJ, Ebersole J (2001) Etiopathogenesis of periodontitis in children and adolescents. Periodontol 2000 26, 54-91
12. Tsuji Y (1988) Evaluate estradiol-17ß in gingival crevicular fluid and their clinical parameter. Nippon Shishubyo Gakkai Kaishi 30, 368-374 (in Japanese)
13. Miyagi M, Aoyama H, Morishita M, Iwamoto Y (1988) Effects of sex hormones on human PMN migration. Nippon Shishubyo Gakkai Kaishi 30, 1033-1039 (in Japanese)
14. Hugoson A (1971) Gingivitis in pregnant woman. A longitudinal clinical study. Odontol Revy 22, 65-84
15. Reinhardt RA, Payne JB, Maze CA, Patil KD, Gallagher SJ, Mattson JS (1999) Influence of estrogen and osteopenia/osteoporosis on clinical periodontitis in postmenopausal woman. J Periodontol 70, 823-828
16. Preshaw PM, Knutsen MA, Mariotti A (2001) Experimental gingivitis in women using oral contraceptives. J Dent Res 80, 2011-2015
17. Mealey BL, Moritz AJ (2003) Hormonal influences: effects of diabetes mellitus and endogenous female sex steroid hormones on the periodontium. Periodontol 2000 32, 59-81
18. Machtei EE, Mahler D, Sanduri H, Peled M (2004) The effect of menstrual cycle on peiodontal health. J Periodontol 75, 408-412