

I.

가

가

8).

1)

tetracycline, penicillin G, metronidazole

2-4).

가

II.

5,6).

1.

1999 1

12

7).

(MTL: microbiological testing laboratory)

1692

*

Post - doc.

738 . ter rectus ¹²⁾, Eikenella cor -
rondes ¹³⁾ .
0.1ml penicillin
1µg penicillin

35 BBAP
10⁻¹ 1µg tetracy -
cline, metronidazole BBAP

paper point 2 - 3 , # 35
10 가
2ml VMGA III transport
screw - capped vial
(pooled sample)
paper point

medium⁹⁾ .
3 . Bac -
teroides thetaiotaomicron
metronidazole

12 48 , Fusobacterium nucleatum
penicillin tetracycline
Clostridium perfringens
TSBV plate 10% CO₂/90% air, 35
3 . 85% N₂,
10% H₂, 5% CO₂ (Coy
Laboratory Products, Ann Arbor, MI.)
가

2. 가
9).

Actinobacillus actinomycetemcomitans,
Prevotella intermedia, Eikenella corodens,
Campylobacter rectus, Capnocytophaga
species, Fusobacterium species,
Peptostreptococcus micros .

1 vortex VMG 3. (immunofluorescence)
dispersion medium⁹⁾ .
가 가
P.gingivalis B.forsythus
가 14).

Enriched BBAP(brucella blood agar
plate)¹⁰⁾ , Actinobacillus actin -
omycetemcomitans 5 42
14),
P. gingivalis B. forsythus
TSBV(T - soy with bacitracin and van -
comycin)¹¹⁾ Campylobac -

37
0.05M fluorescein 가
(PBS) B.forsythus P.gingivalis
1:320 가 4.
37 vortex
FITC(fluorescein isothiocyanate) cover glass
goat - anti - rabbit immunoglobulin (Cappel 1000
Research Products, Durham, NC) 1 Listgarten Hellden
14)
90% glycerol , ,
slide glass .
III.
P. gingivalis P.
gingivalis ATCC strain 25611, B. forsythus 1692
B. forsythus ATCC
strain 43047 738 (Table 1).
Prevotella intermedia Fusobacterium
nucleatum 가 가
1000

Table 1. Descriptive Statistics From a Total of 1692 Microbial Samples

Cases of refractory and/or recurrent periodontitis	738
Females	422
Males	316
Age	
Range	22 - 76
Mean	51

Table 2. Actinobacillus actinomycetemcomitans Data

Number of A.actinomycetemcomitans - positive samples/total	44/738
Number of samples with A.actinomycetemcomitans levels above 0.01%*	43/44
% recovery in positive samples	
Range	0.001 - 17.5
Mean	1.5
Prevalence of tetracycline resistance	16/44
Prevalence of penicillin resistance	41/44
Prevalence of metronidazole resistance	40/44

*Critical value of 0.01% based on data from Slots⁽¹⁰⁾ and Bragd et al⁽¹⁶⁾.

Table 3. *Prevotella intermedia* Data

Number of <i>P.intermedia</i> - positive samples/total	246/738
Number of samples with <i>P.intermedia</i> levels above 2.5%*	150/246
% recovery in positive samples	
Range	0.001 - 70.70
Mean	7.83
Prevalence of tetracycline resistance	74/246
Prevalence of penicillin resistance	70/246
Prevalence of metronidazole resistance	6/246

*Critical value of 2.5% based on data from Loesche et al⁽¹⁷⁾., Dzink et al^(18,19)., Bragd et al⁽¹⁶⁾., and Mombelli et

Table 4. *Eikenella corrodens* Data

Number of <i>E.corrodens</i> - positive samples/total	97/738
Number of samples with <i>E.corrodens</i> levels above 1.0%*	30/97
% recovery in positive samples	
Range	0.001 - 15.4
Mean	1.27
Prevalence of tetracycline resistance	48/97
Prevalence of penicillin resistance	51/97
Prevalence of metronidazole resistance	90/97

*Critical value of 1.0% based on data from Savitt and Socransky⁽²¹⁾, Dzink et al^(18,19)., Tanner et al⁽²²⁾., and

Table 5. *Campylobacter rectus* Data

Number of <i>C.rectus</i> - positive samples/total	473/738
Number of samples with <i>C.rectus</i> levels above 2.0%*	133/473
% recovery in positive samples	
Range	0.001 - 57.3
Mean	1.96
Prevalence of tetracycline resistance	0/133
Prevalence of penicillin resistance	0/133
Prevalence of metronidazole resistance	0/133

*Critical value of 2.0% based on data from Dzink et al^(18,19)., and Tanner et al⁽²²⁾..

Table 6. *Capnocytophaga* Species Data

Number of <i>Capnocytophaga</i> - positive samples/total	90/738
Number of samples with <i>Capnocytophaga</i> species levels above 5.0%*	9/90
% recovery in positive samples	
Range	0.02 - 46.20
Mean	2.7
Prevalence of tetracycline resistance	37/90
Prevalence of penicillin resistance	37/90
Prevalence of metronidazole resistance	54/90

*Critical value of 5.0% based on data from Loesche et al⁽⁷⁾., and Dzink et al^(18,19)..

Table 7. *Fusobacterium* Species Data

Number of <i>Fusobacterium</i> - positive samples/total	578/738
Number of samples with <i>Fusobacterium</i> levels above 5.0%*	292/578
% recovery in positive samples	
Range	0.01 - 93.3
Mean	8.8
Prevalence of tetracycline resistance	71/578
Prevalence of penicillin resistance	73/578
Prevalence of metronidazole resistance	1/578

*Critical value of 5.0% based on data from Savitt and Socransky²¹⁾, Loesche et al¹⁷⁾., Dzink et al^{18,19)}., and

Table 8. *Peptostreptococcus micros* Data

Number of <i>P.micros</i> - positive samples/total	425/738
Number of samples with <i>P.micros</i> levels above 2.5%*	349/425
% recovery in positive samples	
Range	0.10 - 90.8
Mean	10.0
Prevalence of tetracycline resistance	40/425
Prevalence of penicillin resistance	0/425
Prevalence of metronidazole resistance	11/425

*Critical value of 2.5% based on data from Dzink et al^{18,19)}.

Table 9. Immunofluorescent Assays. *Porphyromonas gingivalis* and *Bacteroides forsythus* Data

Number of <i>P.gingivalis</i> - positive samples/total	433/738
Number of samples with <i>P.gingivalis</i> levels above 0.5%*	429/433
% <i>P.gingivalis</i> in positive samples	
Range	0.3 - 32.1
Mean	7.4
Number of <i>B.forsythus</i> - positive samples/total	625/738
Number of samples with <i>B.forsythus</i> levels above 1.0%**	520/625
% <i>B.forsythus</i> in positive samples	
Range	0.2 - 31.6
Mean	2.8

*Critical value of 0.5% based on data from Bragd et al⁶⁾.

**Critical value of 1.0% based on data form Lai et al⁴⁾.

2). Table 2 Table 10

Table 10. Darkfield Microscopic Assays

Number of spirochete - positive samples/total	184/274
Number of samples with spirochete levels above 5.0%*	80/184
% spirochetes in positive samples	
Range	1.0 - 4.2
Mean	6.2
Number of motile rod - positive samples/total	125/274
Number of samples with motile rods levels above 5.0%*	51/125
% motile rods in positive samples	
Range	1.0 - 47.0
Mean	5.8
Number of coccoid cell - positive samples/total	274/274
% coccoid cells in positive samples	
Range	6.0 - 99.0
Mean	57.9

*Critical value of 5.0% based on data from Listgarten and Hellden⁽⁵⁾, Savitt and Socransky⁽²¹⁾, and Mombelli

가
 1 µg/ml tetra -
 cycline, penicillin, metronidazole
 BBAP 가
 Table 10
 Porphyromonas gingivalis Bacteroides
 forsythus 가
 23 - 27). Robinson James⁽²³⁾ 20가
 E.corrodens tetracycline
 10가
 IV. plate dilution technique
 0.4 µg/ml(0.1 1.8) ampicillin
 Slot Rams 10% 가
 2). 1.5 µg/ml(0.6 - 3.1) peni -
 cillin G가 가 metronidazole
 1692 738 가 lincomycin(>100 µg/ml, >100)
 가 가 Sutter
 43 % 28)
 Slot Rams 3 penicillin G가 2 U/ml 193
 98% 가
 (cross sectional study) Metronidazole
 가 Fusobacterium, Capnocytophaga,
 90%

가 . Tetracycline Baker ²⁶⁾ 18가

Slot ²⁴⁾ 57가 2
15가
. 1 µg/ml 가 89%가 tetracycline
tetracycline(100%),
minocycline(91%), chloramphenicol(90%) Goodson Tanner³¹⁾
, clin - tetracycline
damycin(100%), ampicillin(95%), ery - 2 -
thromycin(71%), penicillin G(69%) metron - tetracycline
idazole(40%) . H ffler ²⁹⁾ 10
45가 14 97%
^{32,33)}
Capnocytophaga 가 3
A. actinomycetemcomitans 가 . Fusobac -
44 3가 terium species tetracycline penicillin
tetracycline(64%), metronidazole(9%),
penicillin G(7%)
Campylobacter rectus
가 가
133
. A. actinomycetemcomitans 가
tetracycline 가
Peptostreptococcus micros 가
425
ciprofloxacin 40 가 tetracycline , 11 가
metronidazole
Kornman Karl³⁰⁾ tetracycline Walker ²⁷⁾
(2-7) P.gingivalis, B.forsythus
tetracycline
6 tetracycline
tetracycline
25.9%
tetracycline 76.6%
Fusobacterium nucleatum
가
Fusobacterium species tetracycline
cline 가

가

4. Eikenella corrodens tetracycline, penicillin G, metronidazole
51%, 47%, 7%

가

5. Campylobacter rectus tetracycline, penicillin G, metronidazole
100%

가

6. Capnocytophaga species tetracycline, penicillin G, metronidazole
59%, 59%, 40%

V.

tetracycline, penicillin G, metronidazole

7. Fusobacterium species tetracycline, penicillin G, metronidazole
88%, 87%, 100%

8. Peptostreptococcus micros tetracycline, penicillin G, metronidazole
91%, 7%, 9%

1.

Bacteroides forsythus(85%), Fusobacterium species(78%), Spirochetes(67%), Campylobacter rectus(64%), Porphyromonas gingivalis(59%), Peptostreptococcus micros (58%), motile rods(46%), Prevotella intermedia(33%), Eikenella corrodens(13%), Capnocytophaga species(12%), and Actinobacillus actinomycetemcomitans(6%)

2. Actinobacillus actinomycetemcomitans tetracycline, penicillin G, metronidazole
64%, 7%, 9%

3. Prevotella intermedia tetracycline, penicillin G, metronidazole
70%, 72%, 98%

VI.

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- Abstract -

Microbial Composition and Pattern of Antibiotic Resistance in Subgingival Microbial Samples From Patients With Refractory Periodontitis

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It is becoming increasingly apparent that periodontitis consists of mixture of diseases, most of which respond favorably to traditional mechanical therapy. Among these variants of the disease, some appear to be associated with unusual microbial infections and defective host defenses. Many of these fail to respond to conventional treatment. The recognition that some forms of periodontitis are refractory to standard periodontal therapy has given rise to a new classification of periodontitis.

A series of 1692 subgingival microbial samples sent to a diagnostic microbiology laboratory included 738 samples that could be identified as compatible with a clinical diagnosis of refractory or recurrent periodontitis. In descending order of prevalence the associated microbiota included *Bacteroides forsythus* (85%), *Fusobacterium*

species (78%), *Spirochetes* (67%), *Campylobacter rectus* (64%), *Porphyromonas gingivalis* (59%), *Peptostreptococcus micros* (58%), motile rods (46%), *Prevotella intermedia* (33%), *Eikenella corrodens* (13%), *Capnocytophaga* species (12%), and *Actinobacillus actinomycetemcomitans* (6%). Antibiotic resistance to tetracycline, penicillin G, or metronidazole was particularly noticeable for *Fusobacterium* species, *Capnocytophaga* species, and *Actinobacillus actinomycetemcomitans*. It was largely absent for *Campylobacter rectus*. No antibiotic data were obtained for *Porphyromonas gingivalis* or *Bacteroides forsythus*, as these species were detected by immunofluorescence. The results indicate that a substantial number of microorganisms associated with refractory periodontitis are variably resistant to commonly used antibiotics. Diagnostic microbiology must be considered an essential adjunct to the therapist faced with periodontal lesions refractory to conventional treatment.