

[DOI] 10.12016/j.issn.2096-1456.2021.03.005

· 临床研究 ·

内窥镜辅助下微创牙周基础治疗的临床疗效评价

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【摘要】 目的 探讨牙周内窥镜辅助下超声龈下刮治及根面平整(subgingival scaling and root planning, SRP)对重度牙周炎治疗的临床疗效。方法 选取2017年6月至2019年1月于南京大学医学院附属口腔医院就诊的Ⅲ-Ⅳ期牙周炎患者19例,随机分为内窥镜组及对照组。内窥镜组在龈上洁治术1周后,牙周内窥镜下行一次SRP;对照组在龈上洁治术1周后,行常规微创下SRP,隔周复查,对探诊出血位点行再次SRP,每个位点SRP最多3次。SRP前、治疗后3个月和6个月,采用Florida探针检查记录牙周状况:探诊深度(probing depth, PD)、探诊出血(bleeding on probing, BOP)阳性率及附着丧失(attachment loss, AL)。结果 $4 < PD \leq 6$ mm位点:两组在基线时,PD、BOP阳性率、AL差异均无统计学意义。内窥镜组和对照组PD、BOP阳性率、AL在治疗后3个月和6个月时较基线均显著下降。PD在治疗后3个月时内窥镜组小于对照组($P < 0.05$),6个月时两组间未见明显差别($P > 0.05$)。BOP阳性率、AL两组在3个月和6个月时均未见明显差别($P > 0.05$)。PD > 6 mm位点:在基线时,内窥镜组的PD、BOP阳性率及AL均比对照组更严重,差异有统计学意义。两组PD、BOP阳性率、AL在治疗后3个月和6个月时较基线均显著下降。但治疗后3个月和6个月后,内窥镜组PD较对照组变的更浅($P < 0.05$),BOP阳性率、AL在治疗后3个月和6个月时两组间没有明显统计学差异($P > 0.05$)。结论 与常规微创下SRP相比,内窥镜下SRP有利于改善PD水平和减少更深位点的BOP及AL。

【关键词】 牙周炎; 龈下刮治; 根面平整; 牙周内窥镜; 牙周基础治疗; 探诊深度; 探诊出血; 附着丧失

【中图分类号】 R78 **【文献标志码】** A **【文章编号】** 2096-1456(2021)03-0171-07

开放科学(资源服务)标识码(OSID)



【引用著录格式】 夏娇娇,李厚轩.内窥镜辅助下微创牙周基础治疗的临床疗效评价[J].口腔疾病防治,2021,29(3):171-177. doi:10.12016/j.issn.2096-1456.2021.03.005.

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【Abstract】 Objective To investigate the clinical effect of periodontal endoscope-assisted scaling and root planing (SRP) in treating advanced periodontitis. **Methods** Nineteen cases of grade III and IV periodontitis selected from June 2017 to January 2019 in the Nanjing Stomatological Hospital, Medical School of Nanjing University were divided into the periodontal endoscope and control groups. In the periodontal endoscope group, SRP was performed under a periodontal microscope in one treatment after initial supragingival scaling; in the control group, SRP was performed under regular conditions, and additional SRP was conducted in positive bleeding on probing sites twice every other week as needed. Periodontal status, including probing depth (PD), bleeding on probing (BOP) and attachment loss (AL), was recorded by a Florida probe. **Results** For sites of $4 < PD \leq 6$ mm, there was no significant difference in PD- and BOP-positive

【收稿日期】 2019-11-28; **【修回日期】** 2020-08-16

【基金项目】 国家自然科学基金面上项目(81670996),南京市医学科技发展资金(QRX17025)

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rates or AL between the two groups at baseline. The PD- and BOP-positive rates and AL in the endoscope group and control group decreased significantly from baseline at 3 and 6 months. PD in the endoscope group was smaller than that in the control group at 3 months ($P < 0.05$). There was no significant difference between the two groups at 6 months ($P > 0.05$). There was no significant difference in the BOP positive rate or AL change between the two groups at 3 months and 6 months ($P > 0.05$). For sites with PD > 6 mm, at baseline, the positive rates of PD, BOP and AL in the endoscope group were more serious than those in the control group, and the differences were statistically significant. The PD- and BOP-positive rates and AL in the endoscope group and control group decreased significantly from baseline at 3 and 6 months. However, PD in the endoscope group became shallower than that in the control group ($P < 0.05$) after 3 and 6 months. There was no significant difference in the BOP positive rate or AL between the two groups ($P > 0.05$). **Conclusion** When compared to regular SRP, periodontal microscope-assisted SRP achieves better improvement in PD and is more beneficial for reducing the BOP and AL of deeper sites.

【Key words】 periodontitis; subgingival scaling; root planning; periodontal endoscope; initial periodontal therapy; probing depth; bleeding on probing; attachment loss

J Prev Treat Stomatol Dis, 2021, 29(3): 171-177.

【Competing interests】 The authors declare no competing interests.

This study was supported by the grants from National Natural Science Foundation of China (No. 81670996) and Nanjing Medical Science and Technique Development Foundation (No. QRX17025).

牙周病是由菌斑生物膜引起的牙周支持组织进行性破坏的慢性疾病,是导致牙齿松动、脱落的主要原因^[1]。牙周病治疗主要目的在于去除病因,消除炎症,恢复牙周生态平衡,促进牙周组织的恢复。目前针对不同严重程度的牙周病采用的治疗方法不尽相同,通常可分为非手术治疗和手术治疗两大类,其中牙周病非手术治疗最为基础且重要^[2]。

传统的牙周病非手术治疗依靠医师手感,在非可视下进行龈下的机械清创,精确性较差。牙周内窥镜主要是以冷光源照射组织表面,经图像传感器处理后将图像呈现在显示器上,医师可即时观察到牙周袋内的情况,这使牙周袋内的炎症组织、龈下菌斑生物膜、牙石和根面的解剖情况可视化^[3];但内窥镜辅助治疗的成本高,耗时长,且操作难度大^[4],目前对于内窥镜辅助治疗的必要性仍存争议。

本研究就牙周内窥镜下的可视化超声龈下刮治及根面平整(scaling and root planning, SRP)与单纯的超声微创下SRP对重度牙周炎的临床疗效进行了对比分析,探讨牙周内窥镜辅助下SRP对重度牙周炎的临床疗效。

1 资料与方法

1.1 病例来源

选取2017年6月至2019年1月于南京大学医学院附属口腔医院牙周科就诊的经临床检查和X

线片检查确诊为符合2018年牙周病和种植体周病国际新分类^[5]中的Ⅲ-Ⅳ期牙周炎患者19例。纳入标准:①无全身系统性疾病;妇女未在妊娠期或哺乳期;②无长期吸烟史和用药史;③口内现存天然牙不少于20颗;④纳入患牙探诊至少有3个位点袋深达4 mm或以上,且至少有一个位点有探诊出血;⑤经过口腔卫生宣教,能有效控制菌斑(菌斑指数 $< 20\%$),且能定期复诊者。

本研究通过南京大学医学院附属口腔医院伦理委员会的审查和批准[2017NL-031(KS)],所有纳入病例已签署患者知情同意书。

1.2 研究分组

所有患者在治疗前2周均完成个性化的口腔卫生宣教和龈上洁治术。将纳入患者随机分成对照组(control group)和内窥镜组(endoscopic group);对照组采用压电式超声器械(EMS,瑞士)行SRP以去除根面牙结石,间隔2周后复查,对于BOP阳性位点再进行复刮,最多2次复刮;内窥镜组在阿替卡因局部麻醉后,在内窥镜(perioscopy[®],美国)下使用压电式超声进行SRP,去净龈下牙石。两组超声均设置为最小有效功率和20~30 mL/min的流量水量^[6]。治疗由3名操作人员完成,操作前均已进行过系统的牙周内窥镜使用培训,并经过了Kappa一致性检验,Kappa值大于0.8。

1.3 观测指标

两组患者分别于术前、术后3、6个月由同一位

术者进行Florida电子探针(Florida company, 美国)探查, 检查牙周组织的相关临床指标: ①探诊深度(periodontal depth, PD); ②探诊出血(bleeding on probing, BOP)阳性率; ③附着丧失(attachment loss, AL), 以术前1周资料为基线数据。

1.4 统计学方法

采用SPSS19.0软件, 进行分析处理。计量资料采用均数±标准差表示。若方差齐、符合正态分布采用配对*t*检验和独立样本*t*检验进行数据分析; 方差不齐或偏态分布的资料采用非参数检验法(Wilcoxon signed ranks test 和 Mann-Whitney test)比较。计数资料采用卡方检验。当*P* < 0.05 认为差异有统计学意义。

2 结果

2.1 基本情况

纳入的19名患者中, 共有女性9名, 男性10

名, 年龄23~38岁。纳入患者的一般情况见表1, 两组年龄(*t* = 2.027, *P* = 0.059)及性别(χ^2 = 0.229, *P* = 0.821)比较差异均无统计学意义。共计纳入235颗患牙, 其中内窥镜组112颗患牙, 对照组123颗患牙, 两组位点数差异无统计学意义(χ^2 = 3.72, *P* = 0.053), 两组资料具有可比性。

表1 纳入患者的一般情况

Table 1 General information of included patients

Group	Age($\bar{x} \pm s$, years)	Gender		Teeth	Research sites	
		Male	Female		4 mm ≤ PD < 6 mm	PD ≥ 6 mm
Endoscopic	33.22 ± 4.09	5	4	112	248	208
Control	29.00 ± 4.90	5	5	123	292	188
<i>t</i> / χ^2	<i>t</i> = 2.027	χ^2 = 0.229			χ^2 = 3.72	
<i>P</i>	0.059	0.821			0.053	

2.2 牙周临床指标比较

两组治疗过程中的PD、BOP阳性率、AL的结果分别见表2、表3、表4~表5。

表2 治疗过程中探诊深度的变化

Table 2 Alteration of probing depth during treatment

Group	Number of sites	4 < PD ≤ 6 mm						Number of sites	PD > 6 mm					
		Baseline	3 months	6 months	<i>P_a</i>	<i>P_b</i>	<i>P_c</i>		Baseline	3 months	6 months	<i>P_a</i>	<i>P_b</i>	<i>P_c</i>
Endoscopic	248	5.05 ± 0.60	3.11 ± 1.25	3.17 ± 1.19	< 0.001	< 0.001	0.404	208	7.96 ± 1.40	3.79 ± 1.36	3.37 ± 1.30	< 0.001	< 0.001	< 0.001
Control	292	5.13 ± 0.59	3.34 ± 1.31	3.26 ± 1.31	< 0.001	< 0.001	0.402	188	7.71 ± 1.55	4.44 ± 1.80	4.24 ± 1.65	< 0.001	< 0.001	0.092
<i>t</i>		1.833	4.633	0.707				6.140	11.741	31.492				
<i>P</i>		0.175	0.031	0.400				0.013	< 0.001	< 0.001				

Kruskal rank test was used for comparison between groups, and Wilcoxon test was used for comparison at different times; a: 3 months vs. baseline; b: 6 months vs. baseline; c: 3 months vs. 6 months

表3 治疗过程中探诊出血阳性率的变化

Table 3 Alteration of bleeding on probing during treatment

Group	Number of sites	4 < PD ≤ 6 mm						Number of sites	PD > 6 mm					
		Baseline	3 months	6 months	<i>P_a</i>	<i>P_b</i>	<i>P_c</i>		Baseline	3 months	6 months	<i>P_a</i>	<i>P_b</i>	<i>P_c</i>
Endoscopic	248	43.96%	20.97%	14.52%	< 0.001	< 0.001	0.060	208	66.35%	15.87%	25%	< 0.001	< 0.001	0.021
Control	292	42.47%	23.29%	13.36%	< 0.001	< 0.001	0.002	188	51.06%	11.70%	18.09%	< 0.001	< 0.001	0.082
χ^2		0.121	0.418	0.151				9.540	1.431	2.777				
<i>P</i>		0.728	0.518	0.698				0.002	0.232	0.096				

a: 3 months vs. baseline; b: 6 months vs. baseline; c: 3 months vs. 6 months

表4 治疗过程附着丧失比较

Table 4 Alteration of attachment loss during treatment

Group	Number of sites	4 < PD ≤ 6 mm						Number of sites	PD > 6 mm					
		Baseline	3 months	6 months	<i>P_a</i>	<i>P_b</i>	<i>P_c</i>		Baseline	3 months	6 months	<i>P_a</i>	<i>P_b</i>	<i>P_c</i>
Endoscopic	248	5.71 ± 1.23	4.36 ± 1.55	4.30 ± 1.55	< 0.001	< 0.001	0.533	208	8.35 ± 1.35	5.10 ± 1.41	5.50 ± 1.71	< 0.001	< 0.001	0.005
Control	292	5.76 ± 1.08	4.32 ± 1.58	4.37 ± 1.73	< 0.001	< 0.001	0.796	188	7.92 ± 1.15	5.20 ± 1.78	5.40 ± 1.61	< 0.001	< 0.001	0.154
<i>t</i>		0.919	0.204	0.221				9.360	0.096	0.409				
<i>P</i>		0.337	0.651	0.638				0.002	0.756	0.522				

Kruskal rank test was used for comparison between groups, and Wilcoxon test was used for comparison at different times; a: 3 months vs. baseline; b: 6 months vs. baseline; c: 3 months vs. 6 months

表5 治疗过程附着丧失改变量比较

Table 5 Comparison of alteration of attachment loss during treatment

Group	Number of sites	4 < PD ≤ 6 mm			Number of sites	PD > 6 mm		
		3 months ^a	6 months ^a	6 months ^b		3 months ^a	6 months ^a	6 months ^b
Endoscopic	248	-1.35 ± 1.64	-1.41 ± 1.63	-0.056 ± 1.39	208	-3.25 ± 1.62	-2.85 ± 1.84	0.39 ± 1.41
Control	292	-1.45 ± 1.46	-1.40 ± 1.58	0.051 ± 1.45	188	-2.72 ± 1.76	-2.52 ± 1.57	0.21 ± 1.67
<i>t</i>		0.196	0.671	0.580		9.923	3.586	1.165
<i>P</i>		0.657	0.412	0.446		0.001	0.058	0.280

Kruskal rank test was used for comparison between groups; a: vs. baseline; b: vs. 3 months

4 < PD ≤ 6 mm位点患者中,内窥镜组和对照组在基线时PD、BOP阳性率、AL差异均无统计学意义;PD > 6 mm位点患者中,在基线时,内窥镜组的PD、BOP阳性率及AL比对照组更严重,差异均具有统计学意义($P < 0.05$)。

4 < PD ≤ 6 mm位点患者中,两组PD、BOP阳性率、AL在3个月和6个月时较基线均显著下降;在3个月时,内窥镜组的PD小于对照组($P = 0.031$),6个月时两组间未见明显差别($P > 0.05$,表2)。BOP阳性率、AL两组在3个月和6个月时均未见明显差别($P > 0.05$)。PD > 6 mm位点患者中,3个月和6个月时,内窥镜组PD较对照组低($P < 0.001$),而BOP阳性率、AL没有显著差异($P > 0.05$)。

2.3 内窥镜辅助超声SRP典型病例

患者,女,37岁,因“右上后牙松动不适数日”就诊。患者数日来自觉右上后牙松动、肿痛,咀嚼不适,影响进食。无吸烟史;否认高血压、心脏病、糖尿病、血液疾病史等,否认抗凝药物使用史,否认药物过敏史。自述堂妹有牙周炎病史,下前牙松动史。平时刷牙2次(早、晚)/天,横竖法,无使用牙线、冲牙器、漱口水等习惯,无定期洁牙或牙周治疗史。口腔检查:全口口腔卫生状况较差,牙龈退缩伴釉牙骨质界暴露,大量黑褐色龈下牙石暴露,牙冠部可见少量色素沉着。牙龈色暗红质松软,龈缘及龈乳头充血肿胀,部分位点有自发性出血,多数位点可探及中至深度牙周袋,袋内可探及大量龈下牙石。全景片示:全口牙槽骨水平吸收达根尖1/3,多数位点牙槽骨吸收达根尖。34、36、32、31、41、44、46松动度为Ⅲ度,26、37、16、42松动度为Ⅱ度以上,37、25、45松动度为Ⅱ度,17、15松动度为Ⅰ度以上,22、33、43、47松动度为Ⅰ度,初诊资料见图1。诊断:牙周炎Ⅳ期。治疗过程:初次龈上洁治后,使用内窥镜辅助超声SRP。术后3月,患者的牙龈出血、肿痛症状显著好转;16、17、11、21、22、23、25、35、36、37、31、41、45、46

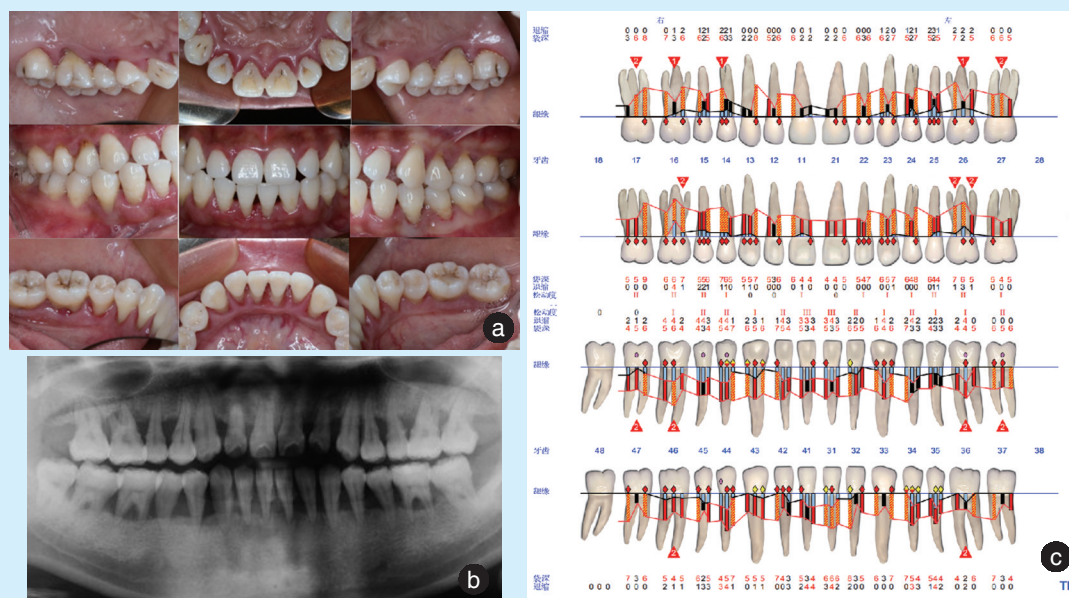
松动度均为Ⅱ度;12、14、15、24、26、27、32、33、34、42、43、44松动度均为Ⅰ度。术后6月,患者的牙周状态稳定,全景片示:全口牙槽骨骨白线形成,牙槽骨水平吸收达根尖1/2至1/3左右;46松动度为Ⅱ度,11、12、14、15、16、17、21、22、23、24、25、26、34、35、36、37、45松动度为Ⅰ度,术后6个月资料见图2。

3 讨论

牙菌斑是牙周炎的始动因子,牙石是促进牙菌斑滞留、牙周袋加深和牙槽骨吸收的重要致病因素^[7]。因此去除龈下牙菌斑和牙石等病源刺激物是牙周炎治疗的基础。然而,在治疗过程中,彻底清除根面牙菌斑和牙石比较困难。研究发现,牙周袋越深,牙石残留率越高,而残留的龈下牙石和粗糙的根面有利于细菌的粘附和牙菌斑的形成^[8]。牙周袋情况的复杂性、牙根的解剖因素、医师的经验以及对触觉的敏感程度等多因素的影响,在临床操作中,医师不可避免的会对易操作到的根面进行过多刮除,而另一些复杂的部位,如根分叉处、根面凹陷或较深的牙周袋底并未能彻底清创。大量研究表明SRP不可避免的会造成根面物质的损失^[9-10],其累积效应常易诱发根面龋坏和牙本质过敏症。

自从20世纪末内窥镜技术应用于牙周病学领域以来,越来越多学者开始关注牙周内窥镜技术辅助牙周治疗的临床效果。牙周内窥镜的应用避免了传统的闭合龈下刮治由于盲视状态带来的盲目性,显示屏展示的图像已经经过了48倍的放大,即使肉眼难以发现的较小牙石也可以被清楚看到,从而不易造成牙石的残留;同时由于可视状态下刮治时的定位更准确,还可避免因反复刮治造成的根面牙骨质过度损伤,有利于牙周组织的愈合^[11]。

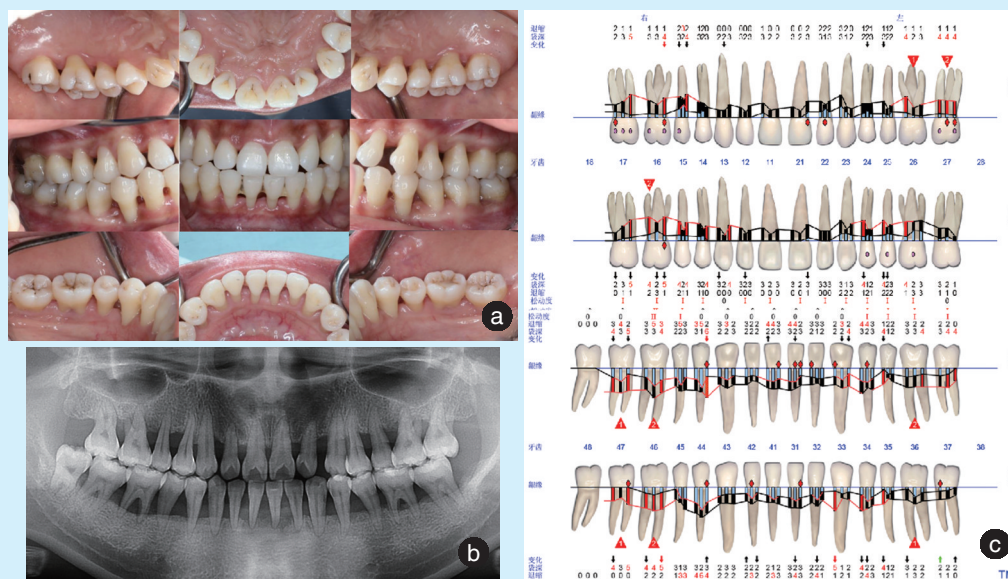
本研究发现4 < PD ≤ 6 mm的位点,术后3



a: intraoral photographs show that the oral hygiene of the whole mouth is poor, gingival withdrawal with enamel bone exposure, a large number of dark brown subgingival calculus exposure, a small amount of pigmentation in the crown, the gingival color is dark and red, the gingival margin and gingival papilla are congested and swollen, some sites have spontaneous bleeding; b: rotational panoramic radiograph shows that total alveolar bone level resorption reached 1/3 of root tip, most sites alveolar bone resorption reached root tip; c: diagram of Florida probing shows that the looseness degrees of 34, 36, 32, 31, 41, 44 and 46 are grade III, 26, 37, 16 and 42 are above grade II, 37, 25 and 45 are grade II, 17 and 15 are above grade I, and 22, 33, 43 and 47 are degree I

Figure 1 Clinical data of typical case of minimally invasive periodontal therapy assisted by endoscope at initial diagnosis

图1 内窥镜辅助下微创牙周基础治疗典型病例初诊临床资料



a: intraoral photographs at 6 months after treatment show that periodontal stability is better; b: rotational panoramic radiograph at 6 months after treatment shows that the alveolar bone white line is formed in the whole mouth, and the alveolar bone absorbed about 1/2 to 1/3 of the root tip; c: diagram of Florida probing at 6 months after treatment shows that the looseness degrees of 46 is grade II, the looseness degrees of 11, 12, 14, 15, 16, 17, 21, 22, 23, 24, 25, 26, 34, 35, 36, 37 and 45 are grade I

Figure 2 Periodontal condition of case at 6 months after minimally invasive periodontal therapy assisted by endoscope

图2 内窥镜辅助下微创牙周基础治疗典型病例术后6个月的牙周情况及全景片

个月的PD内窥镜组较对照组改善明显,术后6个月两组无明显差异;术后3个月和6个月,两组间的BOP阳性率、AL均无明显统计学差异。这说明对于中等深度牙周袋内窥镜辅助治疗在短期内就可产生明显的疗效。

对于深度牙周袋(PD > 6 mm),本研究发现即使内窥镜组PD、BOP阳性率及AL在基线时均比对照组严重,但在术后3个月和6个月内窥镜辅助治疗仍比单纯复刮产生了更明显的PD的改善,这说明在内窥镜可视状态下更能彻底清除根面的牙菌斑、牙石^[12];而BOP阳性率及AL虽有下降,但两组无明显差异。这一方面可能是因为本研究纳入的均是广泛型重度牙周炎病例,而水平型牙槽骨吸收位点的牙槽骨一旦破坏,很难再生^[13],这是牙周科面临的难题;而且由于内窥镜视野的工作深度允许焦距为2~6 mm,一般4.5 mm最为适宜,所以对于更深部的牙周袋,即使借助内窥镜也很难彻底去尽袋底的残余牙石;同时重度牙周炎的袋内壁往往存在感染、出血、溃烂、脓肿等,又会进一步影响内窥镜下的视野,导致袋底的牙石残留率增加,牙周组织再生更加困难^[14]。既往研究认为SRP对浅牙周袋的疗效明确,而对于深牙周袋,往往需要牙周手术才能有效控制炎症^[15]。本研究结果提示内窥镜辅助SRP对于更深牙周袋进行基础治疗仍可以产生较好的短期疗效,这对减少翻瓣手术有积极意义。

廖雁婷等^[16]以超声洁治后1周为基线,采用分口自身对照研究的方法比较了内窥镜与传统SRP的短期疗效,发现两组术后6周和术后3个月PD和AL较基线均有显著改善。本研究将龈上洁治后1周设为基线,一方面去除患者龈上、龈下的大块牙石,可提高后期治疗效率,尤其是内窥镜辅助治疗的效率,缩短操作时间。Kuang等^[4]的系统评价发现内窥镜辅助SRP治疗后虽然牙石残留百分率比传统SRP低,但治疗时的耗时更久。当去除了龈下的大块牙石后再进行内窥镜辅助治疗,可充分发挥内窥镜实时、精准定位的优势;另一方面SRP可显著控制患牙的急性炎症,降低牙龈出血指数,利于内窥镜辅助治疗时视野清晰。由于内窥镜技术是将内窥镜探头放置于龈下,当炎症较重,袋内出血较多时,会使视野变模糊,将难以观察袋内情况,完成龈下清创^[3]。

本研究具有一定局限性,本研究纳入基线存在差异以及纳入的样本量有限,这可能是本研究

组间差异不明显的原因,后续需要扩大样本量,严格设计随机对照研究进一步分析内窥镜在不同探诊深度、单根牙与多根牙、是否存在根分叉病变、牙松动度等可能影响牙周治疗效果的位点进行深入探讨,进一步评价内窥镜下SRP的疗效。

4 小 结

综上所述,内窥镜辅助下SRP既能增加根面清创的有效性,减少患者的就诊次数,减少多次SRP对根面的损伤,减轻患者的痛苦;此外,内窥镜辅助SRP与传统SRP相比,对于深牙周袋患牙疗效更具优势。

【Author contributions】 Xia JJ processed the research, collected and analyzed the data, wrote the article. Li HX designed the study, reviewed the article. All authors read and approved the final manuscript as submitted.

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(编辑 周春华, 曾曙光)



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· 短讯 ·

《口腔疾病防治》杂志再次入选中国科技核心期刊 (中国科技论文统计源期刊)

由广东省卫生健康委员会主管,南方医科大学口腔医院、广东省牙病防治指导中心主办的《口腔疾病防治》杂志于2020年12月再次入选中国科技核心期刊(中国科技论文统计源期刊)。

在此,编辑部谨向全体编委、审稿专家、广大读者和作者表示衷心的感谢!期待大家一如既往地关心、支持杂志的发展,共同推进一流科技期刊的建设。

《口腔疾病防治》编辑部