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无托槽隐形矫治技术矫治重度牙周炎伴咬合紊乱患者的 临床牙周指标及疗效分析*

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摘要 目的:探讨与分析无托槽隐形矫治技术对重度牙周炎伴咬合紊乱患者临床牙周指标的影响。**方法:**选择 2019 年 1 月到 2021 年 5 月在本院诊治的重度牙周炎伴咬合紊乱患者 90 例作为研究对象, 根据简单分配原则把患者分为隐形组与传统组各 45 例。传统组给予传统直丝弓固定矫治技术治疗, 隐形组给予无托槽隐形矫治技术治疗, 两组都治疗观察 6 个月。在矫治前及矫治 6 个月后观察牙周指标, 并检测龈沟液中细胞因子含量。**结果:**治疗后隐形组的总有效率为 97.8%, 与传统组的 84.4% 相比显著提高 ($P<0.05$)。治疗后两组的临床牙周指数都明显低于治疗前, 隐形组与传统组相比也显著降低 ($P<0.05$)。两组治疗后的血清 IL-1 β 与 TNF- α 含量明显低于治疗前, 隐形组与传统组相比也明显降低 ($P<0.05$)。治疗期间隐形组的牙龈萎缩、牙周粘连、牙根吸收、牙釉脱矿等并发症发生率为 6.7%, 明显低于传统组的 24.4% ($P<0.05$)。**结论:**无托槽隐形矫治技术早期矫治重度牙周炎伴咬合紊乱能抑制龈沟液炎症因子的表达, 能改善牙龈指数与菌斑指数, 提高疗效, 减少并发症。

关键词:无托槽隐形矫治技术; 重度牙周炎; 咬合紊乱

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Clinical Periodontal Indexes and Curative Effect Analysis of Bracketless Invisible Orthodontic Technique in Patients with Severe Periodontitis and Occlusal Disorder*

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ABSTRACT Objective: To explore and analyze the effect of invisible orthodontic treatment without brackets on clinical periodontal indexes in patients with severe periodontitis and occlusal disorder. **Methods:** A total of 90 patients with severe periodontitis and occlusal disorders who were diagnosed and treated in our hospital from January 2019 to May 2021 were selected as the research subjects. According to the simple allocation principle, the patients were divided into the invisible group and the traditional group with 45 cases each. The traditional group was treated with traditional straight wire fixation orthodontic technique, and the invisible group was treated with invisible orthodontic technique without brackets. Both groups were treated for 6 months. Periodontal indexes were observed before and 6 months after orthodontic treatment, and cytokine levels in gingival crevicular fluid were detected. **Results:** After treatment, the total effective rate of the invisible group was 97.8%, which was higher than that of the traditional group (84.4%) ($P<0.05$). The clinical periodontal index in both groups was lower than before treatment, and the invisible group was also lower compared to the conventional group ($P<0.05$). The levels of serum IL-1 β and TNF- α in the two groups after treatment were lower than those before treatment ($P<0.05$), and the invisible group was also lower than that in the traditional group ($P<0.05$). During the treatment period, the incidence of complications such as gingival recession, periodontal adhesion, root resorption, and enamel demineralization in the invisible group was 6.7%, which was lower than that in the traditional group (24.4%) ($P<0.05$). **Conclusion:** Bracket-free invisible orthodontic treatment can inhibit the expression of inflammatory factors in gingival crevicular fluid, improve the gingival index and plaque index, promote the improvement of treatment effect and reduce complications in the early treatment of severe periodontitis with occlusal disorder.

Key words: Bracketless invisible orthodontic technique; Severe periodontitis; Occlusal disorder

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前言

牙周炎是口腔科的常见病,其发病早期临床症状不明显^[1,2]。但是随着病情的进展,很多重度牙周炎伴随有咬合紊乱,且发

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现咬合紊乱可能作为一种危险因素,导致牙周病发展加重,从而形成恶性循环^[3,4]。特别是在创伤作用下,重度牙周炎患者的余留牙易松动移位,严重者发生余留牙咬合不良,并出现颞下颌关节功能紊乱,严重影响患者颜面特征、美观特征及口腔卫生健康^[5]。随着医学观念的进步与人民生活水平的提高,选择进行口腔正畸治疗的患者逐年增加^[6,7]。不过传统托槽矫治器口内粘接面积较大,存在结扎丝扎嘴、复诊时间较长等特点,容易引起细菌斑块积聚^[8]。无托槽隐形矫治技术具有美观性、隐蔽性等特点,常被临床广泛应用于牙齿排齐、间隙关闭、倾斜的治疗,可帮助口腔恢复正常咬合状态,从而改善牙周炎患者的临床症状^[9,10]。本文具体探讨与分析了无托槽隐形矫治技术早期矫治重度牙周炎伴咬合紊乱的效果,以明确无托槽隐形矫治技术的应用价值与机制。现报道如下。

1 资料与方法

表 1 两组一般资料

Table 1 Two groups of general data

Groups	n	Dental crowding degree (mm)	Body mass index (kg/m ²)	Gender (male / female)	Disease course (month)	Age (year)	Anclassification (Class I / Class II / Class III)
Invisible group	45	10.44± 1.11	22.48± 1.11	23/22	8.28± 0.14	24.50± 1.14	22/10/13
Traditional group	45	10.48± 0.87	22.91± 0.82	24/21	8.34± 0.29	24.65± 1.17	23/12/10

1.2 治疗方法

正畸治疗前,患者均接受牙周基础治疗,经诊断确认牙周炎处于静止期后再开始正畸治疗,牙周治疗和正畸治疗均由同一名牙周医生和同一名正畸医生完成。

传统组:进行传统固定矫治技术治疗,矫正前利用 X 线确认患者的牙槽骨状况,选择 3M 直丝弓矫治器对牙齿进行排列。上、下颌粘托槽,整平排齐牙列,矫治 4 周后复诊,更换弓丝,加力调整。

隐形组:进行无托槽隐形矫治技术治疗,检查并评估患者矫治前后全口牙齿状况,在专业设计软件辅助下为其定制针对性的无托槽隐形矫治器。并叮嘱患者注意每日佩戴时间需保持在 20 小时左右,并每隔 2 周更换下一付矫治器。

两组都治疗观察 6 个月。

1.3 观察指标

(1)在治疗后进行疗效判定,显效:牙齿排列整齐,上颌前牙上下咬合、覆盖情况正常,间隙闭合;有效:牙齿排列基本整齐,上颌前牙上下咬合、覆盖覆盖情况显著好转;无效:无达到上述标准甚或恶化。(显效+有效)/组内例数×100.0%=总有效率。

(2)分别于矫治前及矫治后 6 个月进行牙周检查,由同一

1.1 研究对象

选择 2019 年 1 月到 2021 年 5 月在本医院诊治的中重度牙周炎伴咬合紊乱患者 90 例作为研究对象。

纳入标准:符合中重度牙周炎伴咬合紊乱的诊断标准;均伴有牙槽骨吸收、牙龈萎缩、牙齿松动、前牙移位等情况;年龄 18-55 岁;面型较好,上下唇均位于审美平面上或以内者;具有矫治指征;患者依从性良好,自愿参与本研究;本次研究经医院伦理委员会批准。

排除标准:治疗资料不全者;矫治禁忌症者;面部创伤或面部手术史者;拔牙矫治者;合并传染性疾病者;妊娠、哺乳期女性;认知功能障碍者;凝血功能障碍者。

根据简单分配原则把患者分为隐形组与传统组各 45 例,两组一般资料对比无差异($P>0.05$)。见表 1。

名牙周医师完成,检测指标包括牙龈指数、菌斑指数、探诊深度和牙龈出血指数。牙周袋探诊深度取一颗牙 6 个探诊位点的平均值。

(3)在治疗前后用滤纸条浸润法收集患者的龈沟液,按照体质比 1:1 比例加入 PBS 缓冲液震荡。取出滤纸后,将标本放入 -80℃ 保存待检。采用酶联免疫法检测龈沟液白细胞介素-1 β (Interleukin-1, IL-1 β) 和肿瘤坏死因子- α (Tumor necrosis factor, TNF- α) 水平。

(4)记录与观察所有患者在治疗期间出现的牙龈萎缩、牙周粘连、牙根吸收、牙釉脱矿等并发症情况。

1.4 统计方法

采用 SPSS25.00 软件对本研究数据进行分析, $P<0.05$ 为差异具有统计学意义。计数资料以[n(%)]表示,使用 χ^2 检验进行比较。计量数据采用均数±标准差表示,行 t 检验,检验水准为 $\alpha=0.05$ 。

2 结果

2.1 总有效率对比

治疗后隐形组的总有效率为 97.8%,与传统组的 84.4%相比显著提高($P<0.05$)。见表 2。

表 2 两组治疗后总有效率对比(n)

Table 2 Total response rate after treatment between the two groups (n)

Groups	n	Excellence	Valid	Invalid	Total effective rate
Invisible group	45	41	3	1	44(97.8%) ^b
Traditional group	45	25	13	7	38(84.4%)

Note: Compared with before treatment, ^a $P<0.05$; Compared with the Traditional group, ^b $P<0.05$, the same below.

2.2 临床牙周指数变化对比

相比也显著降低($P<0.05$)。见表3。

治疗后两组的临床牙周指数较治疗前低,隐形组与传统组

表3 两组治疗前后牙龈指数、探诊深度、菌斑指数及牙龈出血指数变化对比(均数±标准差)

Table 3 Comparison of changes in gingival index, plaque index, probing depth and gingival crevicular bleeding index between the two groups before and after treatment (mean± standard deviation)

Groups	n	Gingival index		Probing depth		Plaque index		Bleeding index	
		Pretherapy	Post-treatment	Pretherapy	Post-treatment	Pretherapy	Post-treatment	Pretherapy	Post-treatment
Invisible group	45	2.39± 0.20	1.14± 0.14 ^{ab}	4.97± 0.32	2.32± 0.26 ^{ab}	2.18± 0.17	1.15± 0.11 ^{ab}	1.65± 0.54	1.05± 0.31 ^{ab}
Traditional group	45	2.36± 0.18	1.25± 0.18 ^a	4.98± 0.24	3.18± 0.28 ^a	2.15± 0.19	1.24± 0.18 ^a	1.62± 0.51	1.26± 0.52 ^a

2.3 血清 IL-1β 与 TNF-α 含量变化对比

与传统组相比也明显降低($P<0.05$)。见表4。

两组治疗后血清 IL-1β 与 TNF-α 含量较治疗前低,隐形组

表4 两组治疗前后血清 IL-1β 与 TNF-α 含量变化对比(mg/L,均数±标准差)

Table 4 Change of serum IL-1 and TNF-content before and after treatment (mg/L, mean ± standard deviation)

Groups	n	IL-1β		TNF-α	
		Pretherapy	Post-treatment	Pretherapy	Post-treatment
Invisible group	45	22.58± 1.48	14.59± 2.10 ^{ab}	16.31± 2.18	5.42± 0.35 ^{ab}
Traditional group	45	22.18± 1.38	18.39± 1.55 ^a	16.29± 1.11	8.65± 1.16 ^a

2.4 并发症情况对比

矿等并发症发生率为6.7%,明显低于传统组的24.4%($P<0.05$)。

治疗期间隐形组的牙龈萎缩、牙周粘连、牙根吸收、牙釉脱

见表5。

表5 治疗期间并发症发生情况对比(n)

Table 5 Comparison of complications (n)

Groups	n	Gingival atrophy	Periodontal adhesion	Dental root resorption	Dental glaze demineralization	Summation
Invisible group	45	0	1	1	1	3(6.7%)
Traditional group	45	3	3	2	3	11(24.4%)

3 讨论

牙周炎在发病前期具有一定的自限性,但疾病后期会出现牙齿松动、移位,进而发生错牙合畸形症状,可造成牙面菌斑聚集,影响患者牙齿美观及功能,形成重度牙周炎伴咬合紊乱^[11,12]。现代研究认为控制咬合与治疗牙周病息息相关,即使咬合紊乱不是牙周炎发病始动因素,但其可能是造成牙周病发展加重的一种危险因素^[13]。重度牙周炎伴咬合紊乱多需要矫治正畸治疗,其治疗原则为消除牙周炎症与减少牙合创伤,最大限度保留患牙,复位移位牙齿。传统固定矫治技术为治疗重度牙周炎伴咬合紊乱的常规方法,具有操作方便、成功率高等优势,但是对于患者的创伤,容易影响患者牙齿的美观及口腔生理环境^[14,15]。

本研究显示:治疗后隐形组的总有效率为97.8%,与传统组的84.4%相比显著提高;治疗期间隐形组的牙龈萎缩、牙周粘连、牙根吸收、牙釉脱矿等并发症发生率为6.7%,明显低于传统组的24.4%,表明无托槽隐形矫治技术早期矫治重度牙周炎伴咬合紊乱能促进提高治疗效果,减少并发症的发生。分析

可知,无托槽隐形矫治技术具有简便、美观、佩戴舒适等优势,以牙齿邻面粘结附件、去釉等方式使牙列排齐。且无托槽隐形矫治技术可依据患者口腔情况制定矫治器,对口腔黏膜刺激较小,且其易于拆卸,便于患者进行清洗,可有效降低并发症情况发生^[16,17]。此外,无托槽隐形矫治器可覆盖机体牙冠大部分位置,降低牙周粘连,改善牙周组织情况,防止发生龈上菌斑迁徙造成牙周组织损坏,防止牙龈萎缩,从而从整体上降低并发症的发生^[18]。

重度牙周炎伴咬合紊乱为口腔科常见错牙合畸形,属于牙齿畸形的一种。传统治疗重度牙周炎伴咬合紊乱的方法可减少弓丝与托槽沟间的摩擦力,但无法有效降低其对牙周组织的刺激性损伤,无法从整体上改善患者的牙周状况^[19,20]。本研究显示治疗后治疗前后两组临床牙周指数均低于治疗前,隐形组与传统组相比也显著降低;表明无托槽隐形矫治技术早期矫治重度牙周炎伴咬合紊乱能改善牙龈炎症、出血等。该结果与许妍^[21]的报道具有相似性。分析可知,无托槽隐形矫治技术在治疗过程中可自由摘取和佩戴,佩戴后可起到隐形效果,不会对患者

的正常进食造成影响。无托槽隐形矫治器完全符合患者自身牙齿错落结构,降低邻牙伸长的发生率,有助于进一步改善其牙齿舒适度和咀嚼程度,佩戴后不会产生强烈的异物感,可保障患者的舒适度^[22,23]。无托槽隐形矫治器可在饮食时自由取下,有利于改善患者口腔内部的生理环境,避免了食物残渣残留于矫治器内的状况,有效减少牙周菌斑数量^[24]。

在重度牙周炎伴咬合紊乱的发生、发展过程,机体会伴随大量且多种类炎症细胞因子的参与,这些因子可能作用于牙周组织重建及修复中^[25]。特别是随着患者病情的进展,细菌与相邻牙组织将会产生一些产物进而进入龈沟液,与此同时口腔所残存致的病菌以血液循环系统作为渠道,导致机体引发慢性炎症,经分析发现龈沟液成分可用于评估机体炎症程度^[26]。本研究显示两组治疗后的血清 IL-1 β 与 TNF- α 含量明显低于治疗前,隐形组与传统组相比也明显降低,表明无托槽隐形矫治技术早期矫治重度牙周炎伴咬合紊乱能抑制龈沟液炎症因子的表达。分析可知,IL-1 β 与 TNF- α 可直接或者间接促进骨吸收,但当其过渡分泌时,将会不断加重机体炎症反应,并抑制金属蛋白酶组织抑制因子的活性,进而造成牙周组织修复能力的损伤,不利于患者康复^[27]。无托槽隐形矫治技术在应用过程中,可通过持续小范围应力促进牙齿移动,无需弓丝及托槽,且不损伤牙周组织^[28]。且无托槽隐形矫治技术采用透明高分子材料,还可紧贴牙齿,可满足患者对美观度的需求,不会产生口腔异物感^[29]。此外,无托槽隐形矫治技术在对于牙齿美观度具有增强作用的同时,也可减少因咬合力所产生的损伤,促进面部恢复,可对牙列拥挤患者产生矫治效果,从而抑制炎症因子的表达^[30]。但本研究对患者进行长期的调查,设置的组别也比较少,将在后续研究中探讨。

综上所述,无托槽隐形矫治技术早期矫治重度牙周炎伴咬合紊乱能抑制龈沟液炎症因子的表达,能改善牙龈指数与菌斑指数,探诊深度及牙周出血指数,能促进提高牙周治疗效果,减少正畸及牙周并发症的发生。

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(上接第 460 页)

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